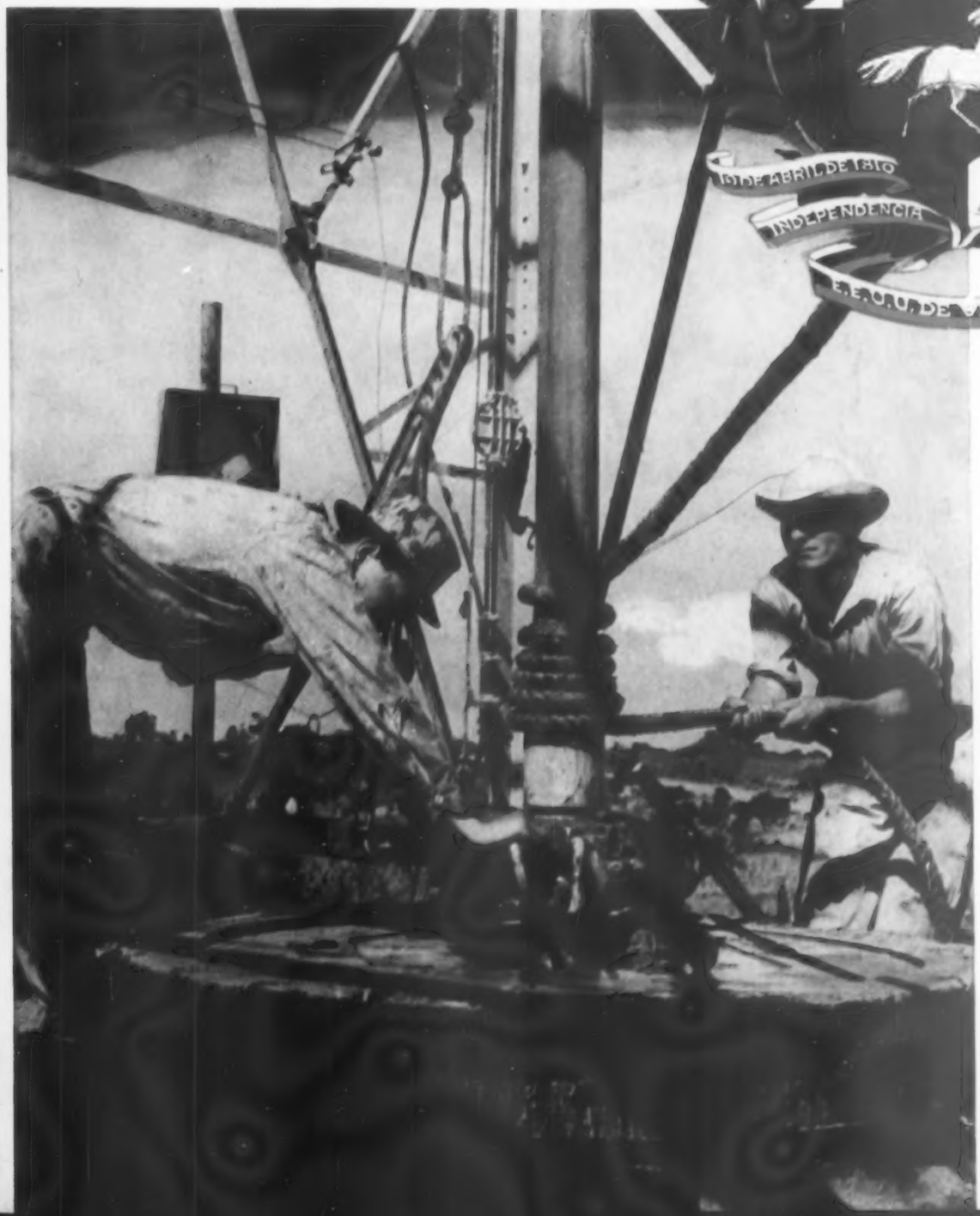
WORLD PETROLEUM

VENEZUELAN OIL



DECEMBER 1939

A Tribute

To Simon Bolivar, national hero of six countries, whose political and military successes are responsible for the present enlightened, democratic administration of Venezuela.

To General Eleazar Lopez Contreras – – and his forward-looking ministers under whose rational and equitable administration the national resources, particularly petroleum, bid fair to reach their highest stage of development.

To the great international organizations – which have furnished the capital and technical experience to make Venezuela the world's second greatest oil producer, whose cooperation with the government has produced, not only oil, but schools, hospitals, roads, harbors and sanitation.

Halliburton Oil Well Cementing Company

BEATING IN TOUGHNESS

and

ENDURANCE

Extra strength and endurance has marked the products of the forge since the days of Tubal-cain—the first smith.

Here at Vogt, glowing steel, heated in automatically controlled furnaces, is kneaded and compacted by mammoth forging hammers. The mightiest efforts of puny man are multiplied, thousands of times over, in beating toughness and endurance IN.

That's why you get so much more in Valves, Fittings and Flanges when they are DROP FORGED by VOGT.

Vogt

DROP FORGED STEEL VALVES *and* FITTINGS

HENRY VOGT MACHINE CO.
INCORPORATED
LOUISVILLE, KENTUCKY

NEW YORK PHILADELPHIA CLEVELAND CHICAGO
CINCINNATI KANSAS CITY DALLAS

World Petroleum (including Petroleum Equipment Exporter), Vol. 10, No. 13, December. Entered as Second Class Matter, March 19, 1938, at the Post Office at Hoboken, N. J., under the Act of March, 1879. Additional entry at the Post Office at Orange, Conn. Published monthly November to September, semi-monthly in October, by Russell Palmer at 95 River Street, Hoboken, N. J.

CAMERON PRESSURE DRILLING CONTROL

"Standard of Comparison the

The fast, positive, unfailing control provided by Cameron Series 900 A.P.I.—6,000 lb. test—Pressure Operated Blowout Preventers, Master Gate Valves and Flow-Line Gate Valves has won the unqualified endorsement of drillers, tool pushers, superintendents and others responsible for the safe drilling and completion of high pressure wells.

THEY CLOSE INSTANTLY—Hydraulic pressure supplied by boiler feed pump, slush pump, or both, controlled by a 4-way valve within easy reach of the driller, closes rams instantly when pressure is applied.

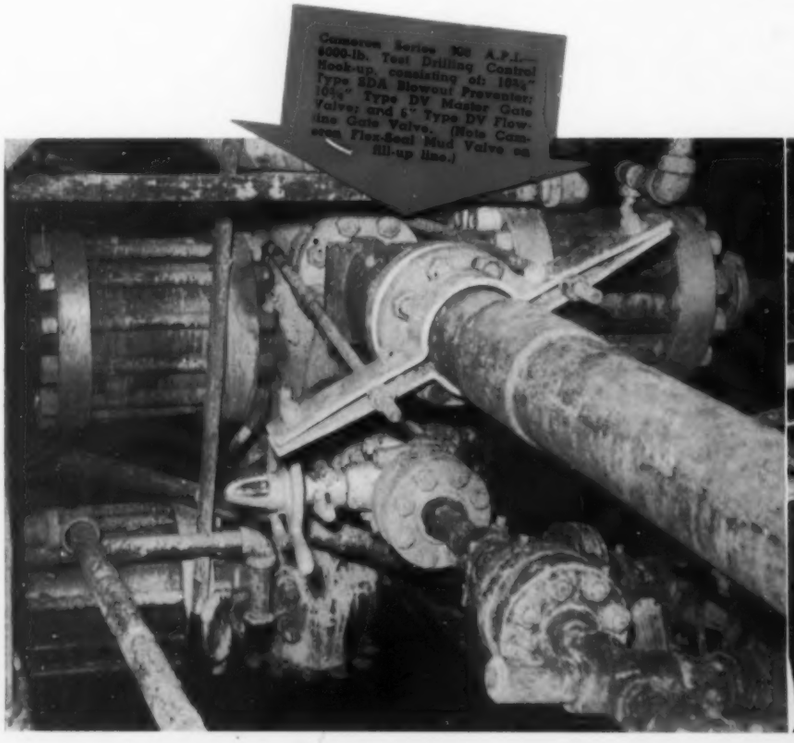
REMOTE CONTROL—Cameron Pressure Operated Blowout Preventers and Gate Valves are remotely controlled from the derrick floor . . . crew members are not required to enter the danger area under the floor to close them.

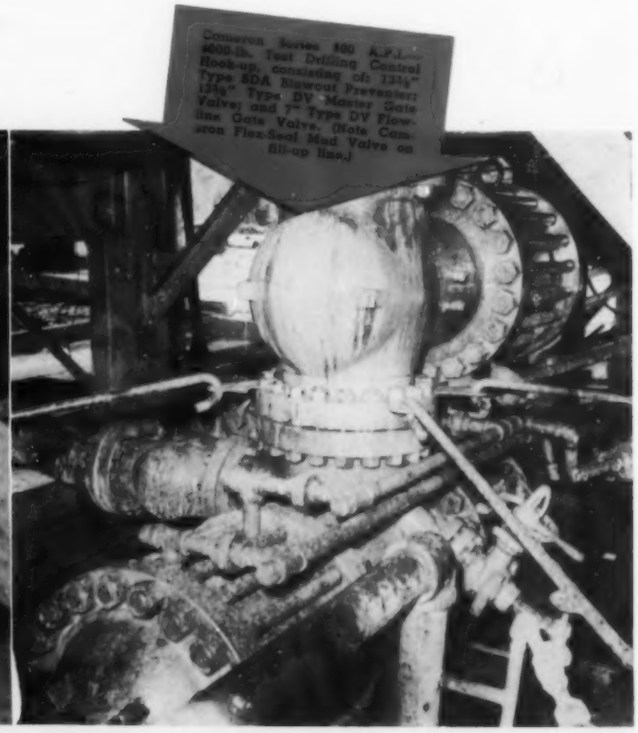
POSITIVE SEAL—Self-Feeding Ram Packing Element makes positive shut-off and permits pipe movement under pressure. This tough, steel-reinforced block of special formula rubber, or neoprene if specified, represents the longest forward step in blowout prevention devised in a decade. It is designed so that when rams are closed rubber is forced to flow to the pipe, where it makes a pressure-tight seal. Each packing element contains many cubic inches of rubber in reserve which, as needed, is automatically fed out to the pipe. This simple but extremely positive ram packing gives drilling crews complete confidence in their ability to shut-in the worst blowout. Angular wing guides, made integral with Type SDA Blowout Preventer rams, automatically center pipe in the hole and totally eliminate danger of rams being held open . . . a frequent cause of loss of control when ordinary control units are used. The wing guides are sufficiently heavy to withstand accidental shock loads, and insure positive closure.

NO UPSTREAM OR DOWNSTREAM SIDE—A Type SDA Preventer may be used right-side-up or up-side-down, if desired, since well pressure is not utilized to effect a positive seal of the annular space.

INTERCHANGEABLE RAMS—Rams to close around many different sizes of pipe are quickly interchangeable in any Cameron Type SDA Preventer. If desired, blind rams to make a full closure of the well bore with pipe out of the hole may be substituted for pipe rams.

Fully descriptive literature, covering numerous other exclusive features of these famous drilling control units, will be gladly sent on request.


Cameron Series 900 A.P.I.—6000-lb. Test Drilling Control Hook-up, consisting of: 10¾" Type SDA Blowout Preventer; 10¾" Type DV Master Gate Valve; and 6" Type DV Flow-line Gate Valve. (Note Cameron Flex-Seal Mud Valve on fill-up line.)

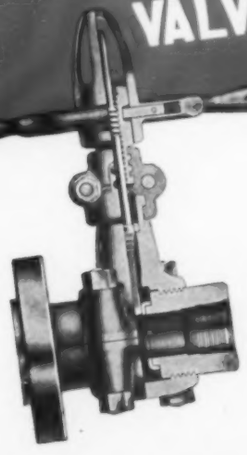

Cameron Series 900 A.P.I.—6000-lb. Test Drilling Control Hook-up, consisting of: 13⅝" 10M Type SDA Blowout Preventer; 13⅝" Type DV Master Gate Valve; and 7" Type DV Flow-line Gate Valve. (Note Cameron Flex-Seal Mud Valve on fill-up line.)

OPERATED UNITS

World Over"

Cameron Pressure Operated Drilling Control Unit consisting of: Series 900 A.P.I. 6000-lb. Test Type SDA Blowout Preventer; Series 900 A.P.I. 6000-lb. Test Type DV Master Gate Valve; and Series 900 A.P.I. 6000-lb. Test Type DV Flow-line Gate Valve. A substantial majority of wells drilling below 7000 feet, in both wildcat and proven high pressure fields throughout the world, are equipped with this standard Cameron Drilling Control Unit.

CAMERON "FLEX-SEAL" MUD VALVE



Cross-section view of a Cameron Flex-Seal Mud Valve, clearly illustrating its unique design.

The Cameron Flex-Seal Mud Valve continues to set new records for trouble-free, economical performance. On unbiased competitive field tests, this Valve has saved up to 93% maintenance.

The Cameron Flex-Seal Mud Valve is the only gate type valve without a metal-to-metal seal. It is provided with a renewable resilient flow-way insert which absorbs the cutting action of abrasive-laden fluid, provides a pressure-tight seat for the gate, and seals the two-piece valve body. This resilient insert, which is good for long service, costs only a few dollars and can be replaced in the field by the drilling crew with ordinary rig tools.

As illustrated in the cross-section drawing herewith, the hubs are connected to the body by a series of interlocking shoulders and grooves, which permit the valve to swivel freely like a union by loosening the four body bolts. This design permits the valve to be quickly fitted with flanged, threaded, welded-on or any special hubs desired.

The Cameron Flex-Seal Mud Valve is of forged steel throughout. All parts subjected to wear are of heat-treated alloy steel. It is available in 2", 3", and 4" sizes, 6000-lb. Test.

CAMERON IRON WORKS, INC. HOUSTON, TEXAS

EXPORT—74 Trinity Place, New York, N. Y. CALIFORNIA DISTRIBUTOR—The Howard Supply Co., Los Angeles OKLAHOMA REPRESENTATIVE—Paul Edkin, Tulsa

INTERNATIONAL HARVESTER

Sells MORE HEAVY-DUTY TRUCKS

Than Any Other

THREE MANUFACTURERS COMBINED

During more than 33 years International Harvester has forged steadily ahead in the manufacture of dependable motor trucks. Today, four large, modern factories are required to supply Internationals in the quantities demanded by truck buyers of the world. As an example of International Truck popularity, consider this significant fact: In addition to the tremendous sale of International Trucks in ½-ton to 1½-ton sizes, *International Harvester sells more heavy-duty trucks* (2-ton and up) *than any other three manufacturers combined.*

International Harvester quality, service, performance, and operating economy have enabled this time-proved organization to gain and hold this leadership in a highly competitive field.

We suggest that you can profitably choose trucks for your own business from this leading line. Complete information on International Trucks may be secured by writing to us direct, or by calling on the nearest International dealer or branch.

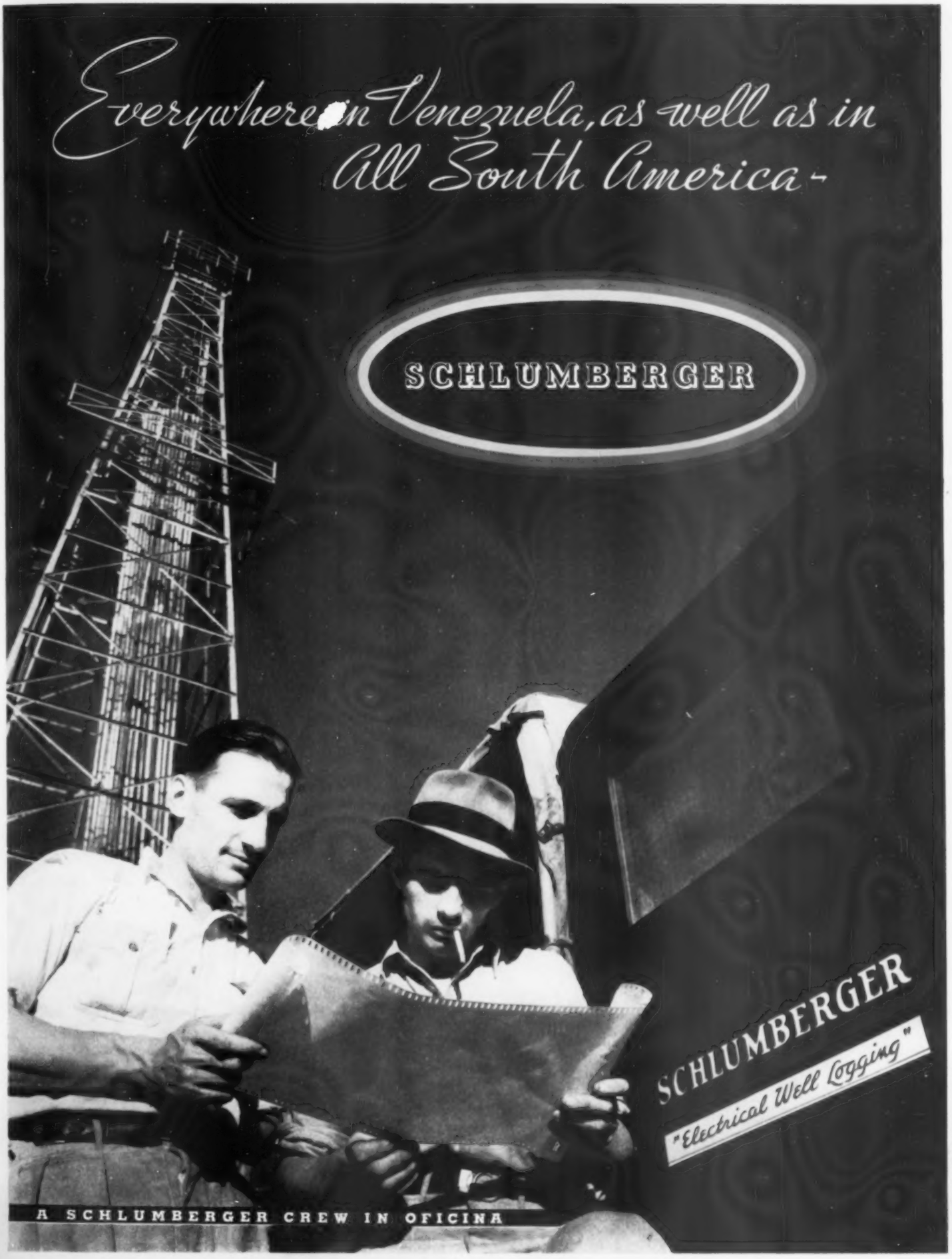
INTERNATIONAL HARVESTER COMPANY
(*Incorporated*)
180 North Michigan Ave. Chicago, Illinois

The VENEZUELAN GOVERNMENT has purchased this slim-hole rotary drilling rig mounted on a powerful International Six-Wheel Truck and will soon put it into action. This unit is rated at 4,000 feet with 2½" OD pipe. It has a 58-ft. derrick-type mast. This is a typical example of the application of International Trucks in the oil industry . . . because of their outstanding reputation for licking the toughest hauling jobs in the world. Internationals get the call when trucks are needed for general or specific jobs.

INTERNATIONAL TRACTORS and POWER UNITS

In addition to motor trucks, International Harvester offers a wide line of crawler and wheel-type tractors (gasoline and Diesel), and power units (gasoline, Diesel, and gas). International TracTracTors (crawlers) range up to the big, powerful TD-18 Diesel. They bring low-cost efficiency to such jobs as digging slush pits, laying pipe lines, clearing land, building roads, moving rigs, servicing wells, etc. International wheel-type tractors are used for various types of trailer work, and combine with equipment built around them for servicing wells and a variety of other work. International Power Units have an impressive record everywhere for pumping and drilling. And their power is being constantly applied to new uses in both the production and refining divisions.

INTERNATIONAL HARVESTER


Everywhere in Venezuela, as well as in All South America -
SCHLUMBERGER
SCHLUMBERGER
"Electrical Well Logging"
A SCHLUMBERGER CREW IN OFICINA

Venezuela...

Jungle Bonanza!

VENEZUELA, the only independent South American country lying completely north of the equator, is a land that nature smiled upon. Lavish were her gifts of two important products, coffee and . . . OIL! Today from Venezuela's oil fields flow nearly *two hundred million barrels of oil a year*—third largest production in the world and almost 80% of the total 1938 production for the entire South American continent!

But this oil isn't bought cheaply. The same tropical climate that spells profits for the coffee grower means headaches for the oil operator. Thick, almost impenetrable jungles grow rampant on every hand and development costs must be carefully watched to keep them in line with production returns. Well locations, already scattered for miles in all directions, must be constantly pushed farther and farther into the back country and each succeeding location is invariably preceded by a difficult transportation problem to be solved before drilling can begin. Trails are blazed as much as 80 miles through closely matted forests to new rig sites and if they're not kept constantly cleared they quickly revert to jungle again.

It's a never-ending battle of man against nature—and high transportation costs—to develop Venezuela's oil reserves and that's why the operators in this country don't take chances with their investments. For here, as in more than twenty other oil producing countries throughout the world, they use the Johnston Formation Tester to guide development programs and cut development costs. With this tool these operators know—BEFORE CASING IS SET—the exact production possibilities of every sand they drill into... which are pay sands, which are dry... and knowing this, they are able to concentrate on the ones they *know* will produce results. They save transportation of needless items and make every string of casing count, forging ahead smoothly, efficiently *and economically!*

Why not investigate this more efficient way to develop oil holdings? Find out how you can make every transportation, casing, and labor dollar go farther... how you can drill *better* wells at *less* cost with the Johnston Formation Tester to guide you!

Ask for your copy of the Johnston Engineering Brochure 112, mailed free on request. It tells you the full story of Johnston Testing Methods and why they are the recognized leader of the industry. Write today!

THE MORE REMOTE THE WELL...

THE GREATER THE NEED TO KNOW!

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"Servicing Mid-Continent and Gulf Coast"

"WHY SET CASING BEFORE YOU KNOW!"

These men are truly pioneers..
and their findings will soon determine whether or not these Venezuela jungle spots are oil fields in the making

PETTY **GEOPHYSICAL ENGINEERING COMPANY**, *San Antonio, Texas*

Now Available: Gravity Surveys **PETTY GRAVITY SURVEYS, Inc.**

Prorated Wells . . .

In these days of strict proration the prime considerations in the choice of pumping equipment for most wells are low investment and low operating costs. With the first cost of Reda lower than any other pumping equipment of the same capacity and operating costs correspondingly low, Reda is the answer to these problems.

We specialize in small capacity equipment for prorated wells.

REDA PUMP CO.

BARTLESVILLE, OKLA.

THE ONLY SUBMERGIBLE ELECTRICAL CENTRIFUGAL OIL WELL PUMP

SUPER FILTROL

WORLD LEADER IN THE ACTIVATED EARTH FIELD SALUTES . . . . . .

VENEZUELA

FIRST IN U.S.A. OIL DRILLING AND REFINING EQUIPMENT IMPORTS ...SECOND IN WORLD OIL PRODUCTION

SUPER FILTROL, world leader in the highly activated, chemically-treated adsorbent field today takes "time out" from its busiest year to pay tribute to Venezuela—and its remarkable rise to a position of leadership in international oil production.

Outdistancing all outside countries in oil production—and in oil machinery and refining equipment imports from the U. S. A.—Venezuela is an honored and valued customer of this country—and the Filtrol Corporation.

SUPER FILTROL'S sale and use in oil refineries everywhere has more than kept pace with this Southern "neighbor's" rapid rise to its present position of eminence in the world of oil.

Today, as yesterday, SUPER FILTROL'S success is based upon its ability to make possible MAXIMUM DECOLORIZATION — MAXIMUM FILTER RATE with MINIMUM CLAY REQUIREMENTS—MINIMUM PLANT EQUIPMENT, producing GREATER OIL RECOVERY, HIGHER QUALITY OILS AND REDUCED REFINING COSTS.

SUPER FILTROL is now used in leading refineries the world over for the economical and efficient production of fine lubricating oils, motor fuels and other petroleum products.

SUPER FILTROL is available not only through our two large plants but at many strategic locations, assuring refineries a constant, quickly obtainable source of supply. For complete information write, wire or cable us at once.

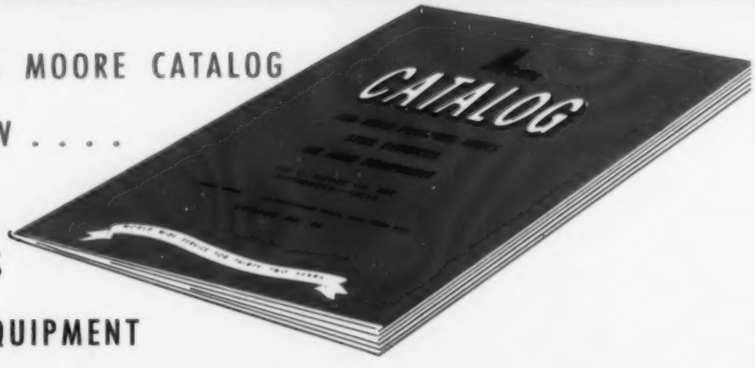
FILTROL CORPORATION

GENERAL OFFICES: 315 W. FIFTH ST., LOS ANGELES, CALIFORNIA

PLANTS: Vernon, California; Jackson, Mississippi

CABLE ADDRESS: FILTROL - LOS ANGELES

YOUR COPY OF THE 1940 MOORE CATALOG
IS READY NOW . . . .
STEEL DERRICKS
RED HEAD PUMPING UNITS
OIL FIELD EQUIPMENT



LEE C. MOORE CO., INC., PITTSBURGH, TULSA *Export Office* 30 ROCKEFELLER PLAZA, NEW YORK

ENGINEERING THAT HAS DEVELOPED WITH THE INDUSTRY

You're Looking at The Oil Country's Number One Hole-Maker

The Hunt Welded-In Blade Bit is the answer to the industry's demand for a drag bit to meet today's deeper, faster drilling requirements. Its profitable advantages, listed below, have made it the most popular drag bit in the Gulf Coast.

The body is cast from alloy steel and heat-treated for maximum strength and durability, and carefully inspected before and after machining. The blades are drop forged from chrome molybdenum steel, dressed with tungsten carbide inserts and tube metal, and carefully heat-treated to insure uniformity in wearing and shock-resisting qualities.

The blade runs entirely through the body, giving greater strength. The design of the blade requires only a small V-weld to weld blade into body . . . thus eliminating 60% of the heat necessary to weld on conventional blade bits. This elimination of heat, after the blade has been heat-treated, gives as near a perfect blade as is possible to build.

The fluid courses are lined with special alloy bushing, assuring a controlled slush action for faster drilling.

This bit, made in both 2-way and 3-way types, offers a material saving in transportation costs for operators outside the United States. One body serves numerous blades, which are readily cut out with a torch and replaced.

Full details, including prices and shipping weights, sent air mail to any country, upon request.

HUNT TOOL COMPANY

HUNT TOOL COMPANY

HOUSTON, TEXAS, U. S. A.

EXCLUSIVE EXPORT DISTRIBUTORS: W-K-M Company, Inc., 74 Trinity Place, New York

FOR MODERN LOW-COST OIL FIELD HAULING... MOTORIZE AND MECHANIZE!

MOTORIZE . . . as the army does with motor trucks . . . when you have paved roads or firm ground . . . and there is no danger of your hauling units miring or bogging down.

MECHANIZE . . . as the army does with tanks—when you have slippery, sticky mud . . . sand . . . frozen ruts.

Motorization is logical *on the pavement* or its equivalent . . . but trucks require a smooth, well maintained road to operate efficiently without delays or breakdowns. Off the pavement, you need to MECHANIZE—with Athey Forged-Trak Trailers, pulled by "Caterpillar" Diesel Tractors.

With their broad, flat tracks, up to 30 inches in width, Athey Forged-Trak hauling units will not "rut" and "churn" water-soaked ground into a sea of mud. They tamp and squeeze out water, helping to mold a firm roadway. Athey Forged-Trak wheels surmount obstructions . . . provide a firm steel highway over rock, snow and ice.

For profitable speed in off-the-pavement hauling, MECHANIZE with Athey Forged-Trak Trailers. See your "Caterpillar" dealer or write us!

ATHEY TRUSS WHEEL CO.
5631 W. 65th ST., CHICAGO, ILL., U. S. A.
CABLE ADDRESS: "TRUSSWHEEL" CHICAGO

← MOTORIZATION FAILED HERE
Mired, bogged down in soft mud . . . much valuable time was lost waiting for a snatch tractor. Take them off "good going," and trucks cannot give you speed in hauling.

MECHANIZATION WORKS HERE →
No tie-ups—no waiting for snatch tractors—no time lost—no hauling schedules missed because of miring, when you "mechanize" with Athey Forged-Trak Oil Field Trailers and "Caterpillar Diesel Tractors."

ATHEY
FORGED-TRAK
OIL FIELD WAGONS
AND TRAILERS

Serving the oil industry in Venezuela. (Above) Power station showing four of five General Electric turbine generators, three 5000 Kw. and two 2500 Kw. (Below) Two views of General Electric substation also in Venezuela.

From drilling rig to filling station

ELECTRIC POWER FOR EVERY PURPOSE

Progress in the production, refining, and distribution of petroleum and petroleum products has been signally marked by the increased electrification of operations. The drilling and pumping of wells, the refining processes of distillation, cracking, etc., the piping of oil to and from the refinery, and the distribution of petroleum products by pipe line, rail, boat, and truck calls for the use of nearly every type of electric equipment.

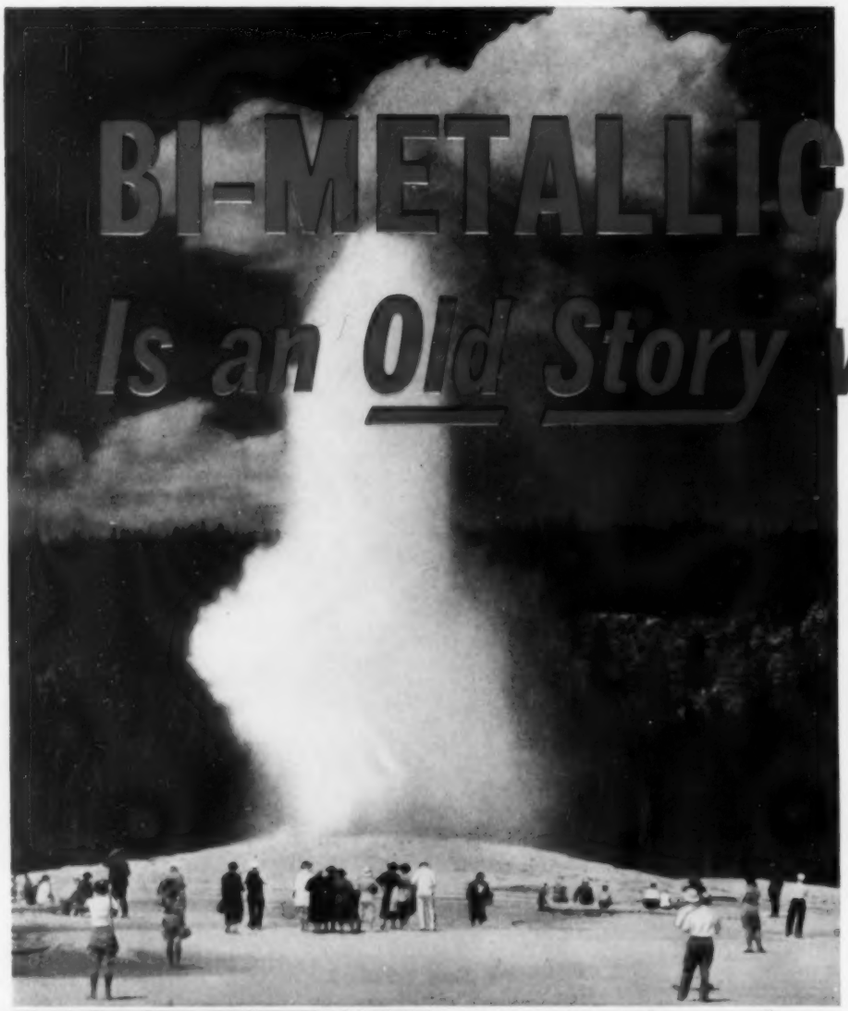
For many years General Electric has been playing a prominent part in furnishing this equipment. Not only has the oil industry found that the General Electric monogram means outstanding dependability, but also oil men have found General Electric engineers ready at all times to co-operate in designing and applying electric equipment that would meet special conditions of service.

Products of the General Electric Co., U.S.A., are available throughout the world from representatives of the International General Electric Co., Inc.

GENERAL ELECTRIC

WP-12-9

BI-METALLIC Construction Is an Old Story with Smith



BI-METALLIC construction, made in the A. O. Smith manner—in other words, *Smithlining*—was pioneered by A. O. Smith ten years ago. It is still the "Old Faithful" in the bi-metallic field for high-pressure, high-temperature service, universally used and accepted wherever there are corrosion problems. Better stick to "Old Faithful" for high-pressure vessels—lined or unlined. A. O. Smith Corporation, Milwaukee, Wisconsin. Offices at New York, Pittsburgh, Chicago, Tulsa, Dallas, Shreveport, Houston, Corpus Christi, Los Angeles.

One of Smith's Latest—a Class I high-pressure vessel, 13′–1-3/16″ inside diameter, 61′-7″ overall length, lined with Type 410 chrome alloy—one of the many different alloys for which Smithlining has been perfected. This vessel is of recent construction.

First Smithlined Pressure Vessel Ten Years in Service—The first high-pressure vessel with corrosion-resisting metallic lining ever to be placed in refining service was shipped to one of America's large refineries almost ten years ago to a day—November 26, 1929, to be exact. This vessel is still in service. Recent exhaustive inspection revealed it to be as serviceable as the day it was installed. This vessel is 5 feet in diameter and 41 feet in length. Its walls are 3 inches thick and Smithlined with 7/64 inch 18-8 stainless steel.

SMITH PRESSURE VESSELS

ASK SMITH ABOUT:

- **Contamination-proof joints**
- **Thermal conductivity**
- **Ability to take temperature changes**
- **Carbon migration**
- **Test of the lining**
- **Surface finish**
- **Stress corrosion**
- **Selection of lining material**

Smithlined Pressure Vessels have a tremendous metallurgical background. The above problems are not new to Smith. Their successful solution is one of the reasons why over 90% of the high-pressure vessels with corrosion-resisting linings now in service are of Smith manufacture.

A.O.SMITH CORPORATION

Milwaukee, Wisconsin

PIONEER MANUFACTURERS OF ELECTRIC-WELDED

Pressure Vessels

Casing · Line Pipe

WHEREVER MEN DRILL FOR OIL···

Lane-Wells Photo-Record Magnetic Single Shot Disc.

···THEY RELY ON LANE-WELLS SURVEY INSTRUMENTS FOR ACCURATE INFORMATION

Film from Multiple Shot Survey Instrument records inclination and direction.

Oil well operators know the value of a permanent record of a well from the surface to the producing sands. Made during drilling, a survey record tells the driller where the bottom of the hole is located at all times and enables him to continue to drill a straight or a directed well. In producing wells survey records are necessary for the development of accurate, effective remedial programs.

Oil well operators the world over know that the cost of surveys or survey instruments is extremely small in comparison with the over-all cost of a completed well. That's why you find Lane-Wells Survey Instruments in every major producing oil field.

LANE-WELLS PRODUCTS

SINGLE SHOT SURVEY INSTRUMENTS
ORIENTING EQUIPMENT
KNUCKLE JOINTS
PACKERS
LINER HANGERS
BRIDGING PLUGS

LANE-WELLS SERVICES

GUN PERFORATING
ELECTROLOGGING
OIL WELL SURVEYS
DIRECTIONAL CONTROL OF DRILLING WELLS

LANE WELLS
TECHNICAL OILFIELD SERVICES
Everywhere

IN VENEZUELA
AND ALL OVER THE WORLD
it's GARDNER-DENVER for
Consistent, Economical Performance

GARDNER-DENVER 20-INCH STEAM SLUSH PUMPS

TROUBLE-FREE PERFORMANCE
Improved Gardner-Denver fluid end assures less fluid friction and quicker filling—makes higher suction lift possible.

QUIET OPERATION
New enclosed roller bearing steam valve gear with telescopic levers is practically noiseless.

LONG LIVED
Gardner-Denver "Slush-Proof" rods, liners and pistons—anti-friction bearings, totally enclosed steam valve gears—sealed proved Gardner-Denver Duo-Seat Valves.

SPECIFICATIONS

GARDNER-DENVER 20" STEAM SLUSH PUMPS		
Size	Maximum Steam Pressure	Maximum fluid pressure with Master Liners
16¼ x8x20	400	1200
18 x8x20	400	1400
20 x8x20	250	1100

All sizes may be furnished with reduced sizes of liners and pistons for higher pressure.

GARDNER-DENVER "FX" POWER SLUSH PUMPS

DIRTPROOF CONSTRUCTION—Oil stop and mud stop have prevented entrance of mud and water into power end. Liner pistons and rods can be changed without opening crankcase—keeps dust and dirt out of working parts.

DEPENDABLE OPERATION—Automatic, positive flood lubrication to working parts. Gardner-Denver proved divided fluid end construction has center guided fluid valves.

SMOOTH RUNNING—Continuous tooth type herringbone gears, Timken Tapered adjustable main bearing and Hyatt roller jackshaft bearing assure smooth operation.

GARDNER-DENVER "FX" POWER SLUSH PUMPS			
Size	Capacity U. S. Gallons per minute	Maximum Pressure	B H P
7¼ x 10	450	365	100
7¼ x 12	495	430	150
7¼ x 14	577	550	200
7¾ x 16	693	575	250
7¾ x 20	774	800	400

All sizes may be furnished with reduced sizes of liners and pistons for higher pressures.

GARDNER-DENVER 14 x 14 DRILLING ENGINE

POWER ON DEEP HOLE DRILLING JOBS—"Heavy duty" engine for use on the deepest wells and with the highest steam pressure encountered in rotary drilling.

LARGE CAPACITY—Designed for 400 pounds maximum steam pressures, it will easily deliver all of the power necessary to operate the heaviest of present day drilling equipment.

UPKEEP AND WEAR AT A MINIMUM—Engine totally enclosed—removable covers permit quick and easy access to all working parts. Gardner-Denver Company, Quincy, Illinois.

GARDNER-DENVER

80th ANNIVERSARY YEAR

DALLAS • HOUSTON • KILGORE • TULSA • LOS ANGELES • SAN FRANCISCO
NEW YORK • CHICAGO • PITTSBURGH

Continental Supply Co., Continental Building, Dallas, Texas • Wagner-Morehouse Inc., 2371 E. 51st St., Los Angeles, Calif. • Republic Supply, 2122 E. 7th St., Los Angeles, Calif.

YOU'RE EQUIPPED FOR ANY EMERGENCY WITH CRANE 343E's

Here's a valve that's matched to the service required in pipe lines. It's built with a stamina that assures extra dependability under the severe working conditions encountered over hill and dale—in marshes and desert—in climates of every kind.

It's the Crane No. 343E double disc gate valve. Made of Crane Ferro-steel, a high-grade iron having a tensile strength approximately 35% greater than that of cast iron; of rugged and massive design, it offers a high factor of safety for its specified rating. With No. 343E's on your lines, you're equipped for any emergency—they're sure to respond when the occasion demands.

Crane No. 343E's are giving durable, low-cost performance in pipe lines and pumping stations all over the world. It will pay you to look into this valve.

CRUDE COMES IN ON SCHEDULE

When Crane Valves Handle the Flow

PIPE lines that carry crude from fie'd to refinery are subject to damage from many causes along the way. The valves in these lines must be thoroughly dependable to minimize loss when a line fails.

Because these valves are, as a rule, infrequently operated with the disc in open or closed position for long periods, it is all-important that they respond unfailingly when it is necessary to sectionalize the line or divert flow. And because Crane valves are engineered to withstand the strains of pipe line service, the effects of corrosive elements both inside and out, you can depend on them for smooth, positive action. Thus, with Crane valves in your pipe lines, the danger of oil and gas losses in transit is definitely lessened.

Consider the need for Crane-Quality valves in your pipe lines from the standpoint of maintenance. You know best the cost of valve replacements—of interrupted service. The extreme accuracy with which Crane valves are built—the careful analysis and specification of materials that go into every part—and Crane's 84-year manufacturing experience assure long, economical performance.

Take advantage of Crane's ability to supply the right equipment for every flow control problem of your industry—in the field, pipe line, pumping station, or refinery. Gain for your operations the advantages of one source of supply—one high standard of quality — and undivided responsibility for your valves, fittings, and piping needs. Choose them from the 38,000 shown in the Crane No. 52 Catalog — or consult your Crane Representative.

CRANE

VALVES • FITTINGS • PIPE
PLUMBING • HEATING • PUMPS

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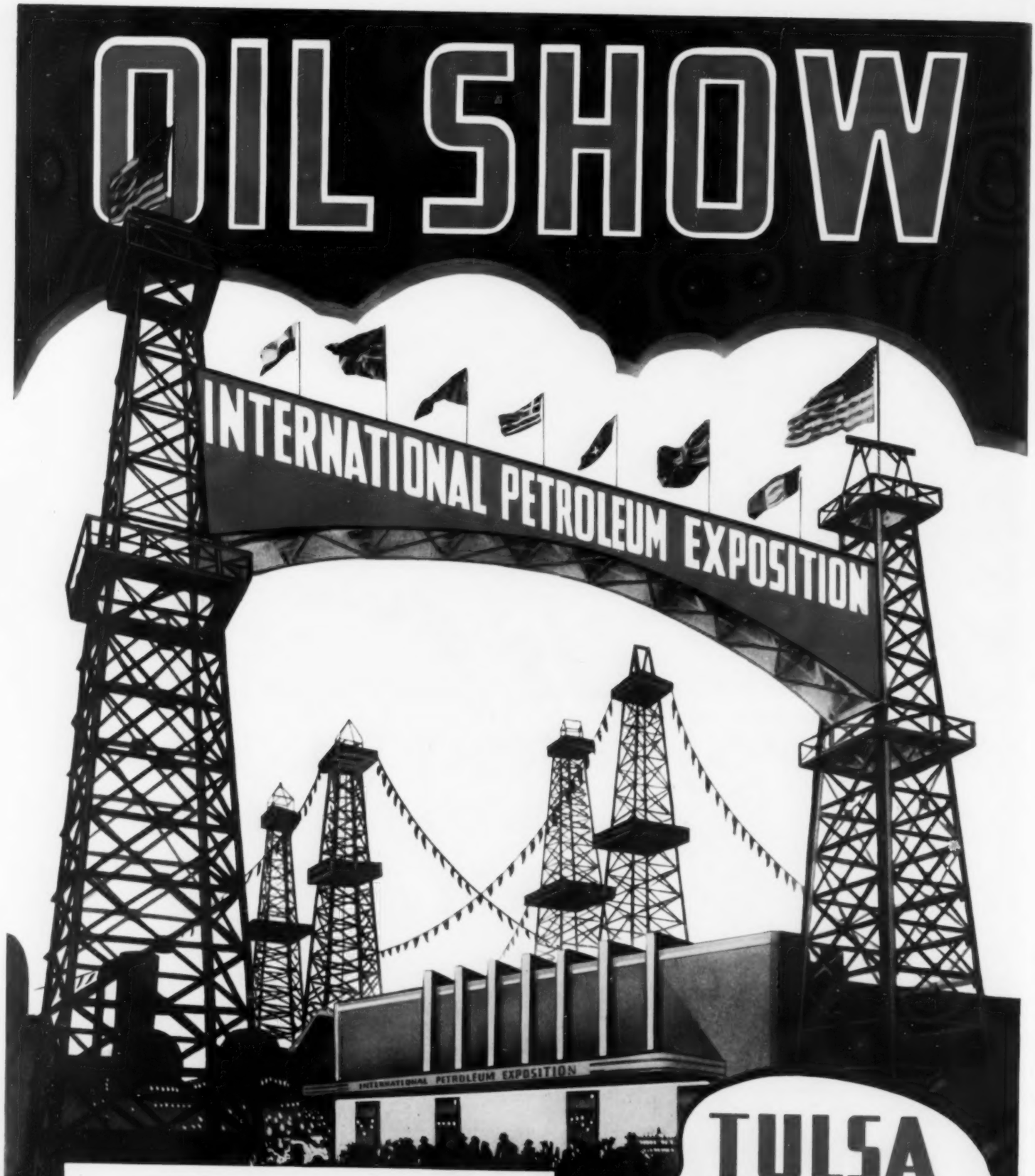
CRANE SERVICE COVERS THE PETROLEUM INDUSTRY THROUGHOUT THE WORLD

OIL SHOW



WAR INCREASES SHOW DEMANDS

The European War has increased the demands for Petroleum Products and greatly stimulated interest in the 1940 International Petroleum Exposition. The methods and equipment for greater recovery of oil, better products, greater operating efficiency and lower costs will be featured at the Exposition. For information write Wm. B. Way, General Manager, Tulsa, Okla.

The World's Fair of the Oil Industry

TULSA
May 18-25
1940

ONE HUNDRED MORE LIVES SAVED *right at the rig!*

★ Look at this rack of fifty or more doubles of drill pipe. There's *new* life, *new* safety and *new* efficiency in every tool joint box and pin... put there quickly and economically—right at the rig—with the Johnston Portable Tool Joint Refacer!

You can effect these savings on repair and replacement costs, too, by having worn tool joints on your drilling strings refaced with the Johnston Tool Joint Refacer. By means of a master gauge, this tool mounts directly on the threads of box or pin and recuts the face *in exact alignment with the threads themselves*, giving a precision job every time. The result is a joint that makes up as pressure-tight and smooth-shouldering as when new. Threads previously unused are now brought into play..."flat" joints make up in new position, protecting worn sides...and your drilling string again stands up under peak pressure loads!

And in overseas fields the Johnston Portable Tool Joint Refacer will save thousands of dollars in transportation and labor costs—costs otherwise incurred when renewing worn tool joints at the machine shop. The Refacer is sturdily built to stand the hardest use, yet it weighs only 150 pounds complete, is easy to carry in the field, and can be operated by one man. Where other electric power is not supplied, a small motor-driven generator is available for use with the tool.

The Johnston Refacer is sold outright for export use, either singly or in pairs. It is completely equipped with master gauges for thread and size of joint required. In California the Johnston Refacer is available on a service basis. Fully equipped service trucks bring the tool to your rig or pipe yard and trained operators do the work in a minimum of time and at reasonable cost. Call your nearest Johnston Service Branch today or write direct for illustrated descriptive folder!

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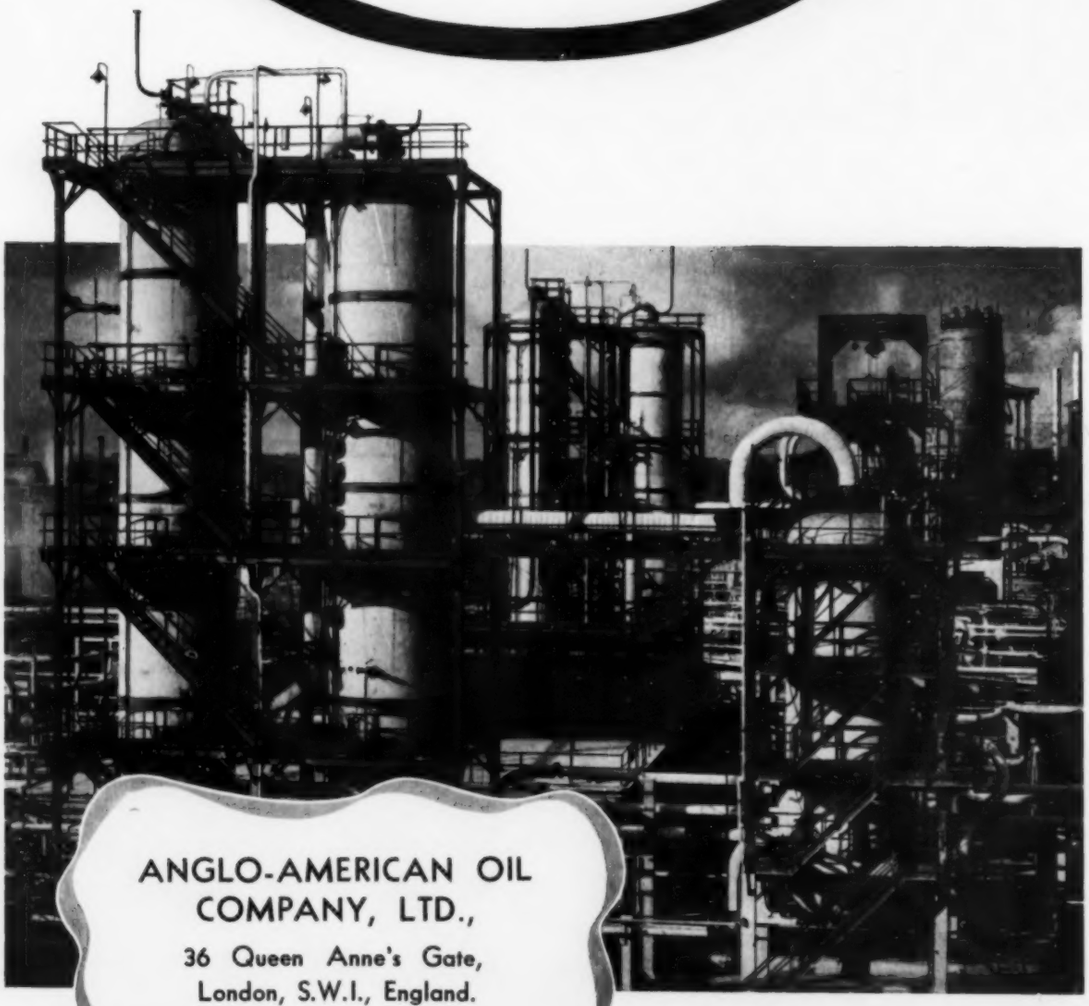
ESSO



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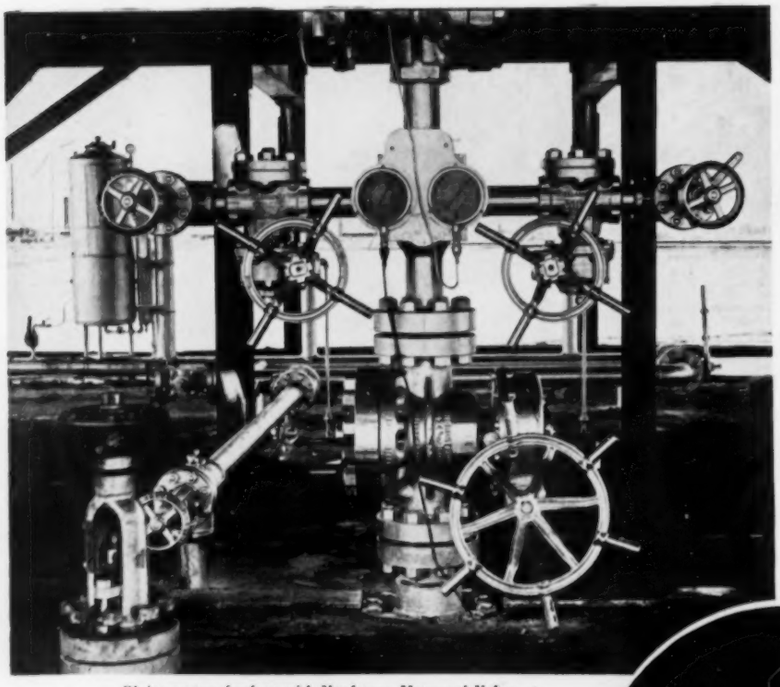
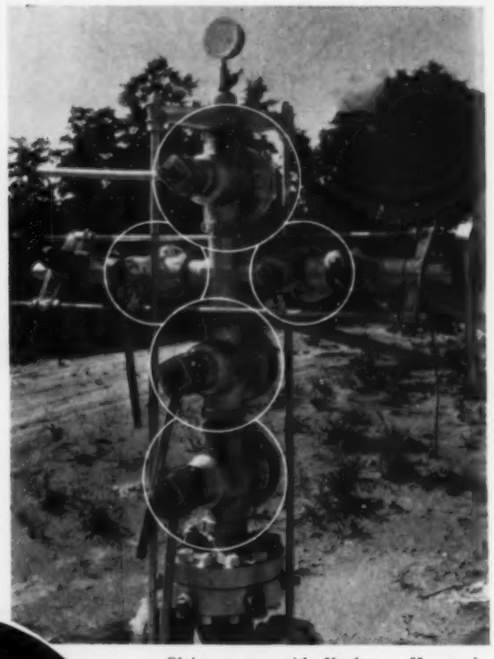
NORDSTROM
LUBRICATED PLUG VALVES



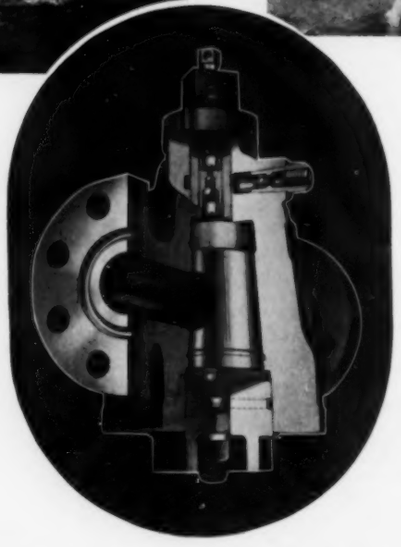
Christmas tree hook-up with Nordstrom Hypreseal Valves at Rio Bravo, California.



Christmas tree with Nordstrom Hypreseal Valves in Marion County, Texas.

CHRISTMAS TREES with NORDSTROMS are 100% *safe*

Handle working pressures up to
5000 lbs.
Tested to 10,000 lbs.



NORDSTROM ROUND-OPENING HYPRESEAL
Internal parts of the valve are totally balanced under extremely high pressures and the plug is constantly and automatically held in its seat. Easy operation and prevention of leakage are assured. At no time is there any fixed variance between the plug and the body.

HYPRESEALS
. . . the preference in every pressure field

One of the outstanding advances in Christmas tree engineering is the widespread adoption of Nordstrom Hypreseal Valves. The Hypreseal was originally introduced with a rectangular opening. It is now available with a round opening which can be used as a drilling-through valve. It provides an unrestricted opening, thus reducing sand-cutting. No eddy or turbulent flow can exist. Nordstroms are the closest approach to indestructible construction, therefore the cheapest in point of service.

Available for temperatures from —150° to +600°

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PRODUCTS: Nordstrom Plug Valves • Nordstrom Air, Curb and Meter Cocks • Nordstrom Valve Lubricants • EMCO Gas Meters • EMCO-McGaughy Integrators • EMCO Regulators • Pittsburgh Meters for Gasoline, Grease, Oil, Water and other Liquids • Raybould Couplings • Stupakoff Bottom Hole Gauges

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GSI has equipment available *in Venezuela* for contract work on short notice. Cost estimates will be cheerfully furnished to those interested.

Our experienced men have worked in every Venezuelan oil-producing state. Why not put their exploration knowledge to work for you?

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PRESIDENT

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The ability to vary the design of Kellogg combination casinghead and polymerization plants to suit existing plant facilities, feed stocks and capacity requirements should interest all manufacturers of natural gasoline.

Increased production of higher octane products characterizes these plants, in which the flexibility of vapor pressure and the quality and quantity of gasoline made are inherent.

Other important economic advantages in these combination plants are:

- Simplicity of operation
- Increased casinghead recovery
- Low labor costs
- Low utility requirements
- Dehydrated residue gas

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- The Polymerization Process Corporation, Thermal and Catalytic Polymerization
- JUIK Processes for Lubricating Oil Refining with Propane and Phenol Deasphalting · Dewaxing · Solvent Extraction and Acid Treating Plants
- The Gray Processes Corporation, Clay Treating

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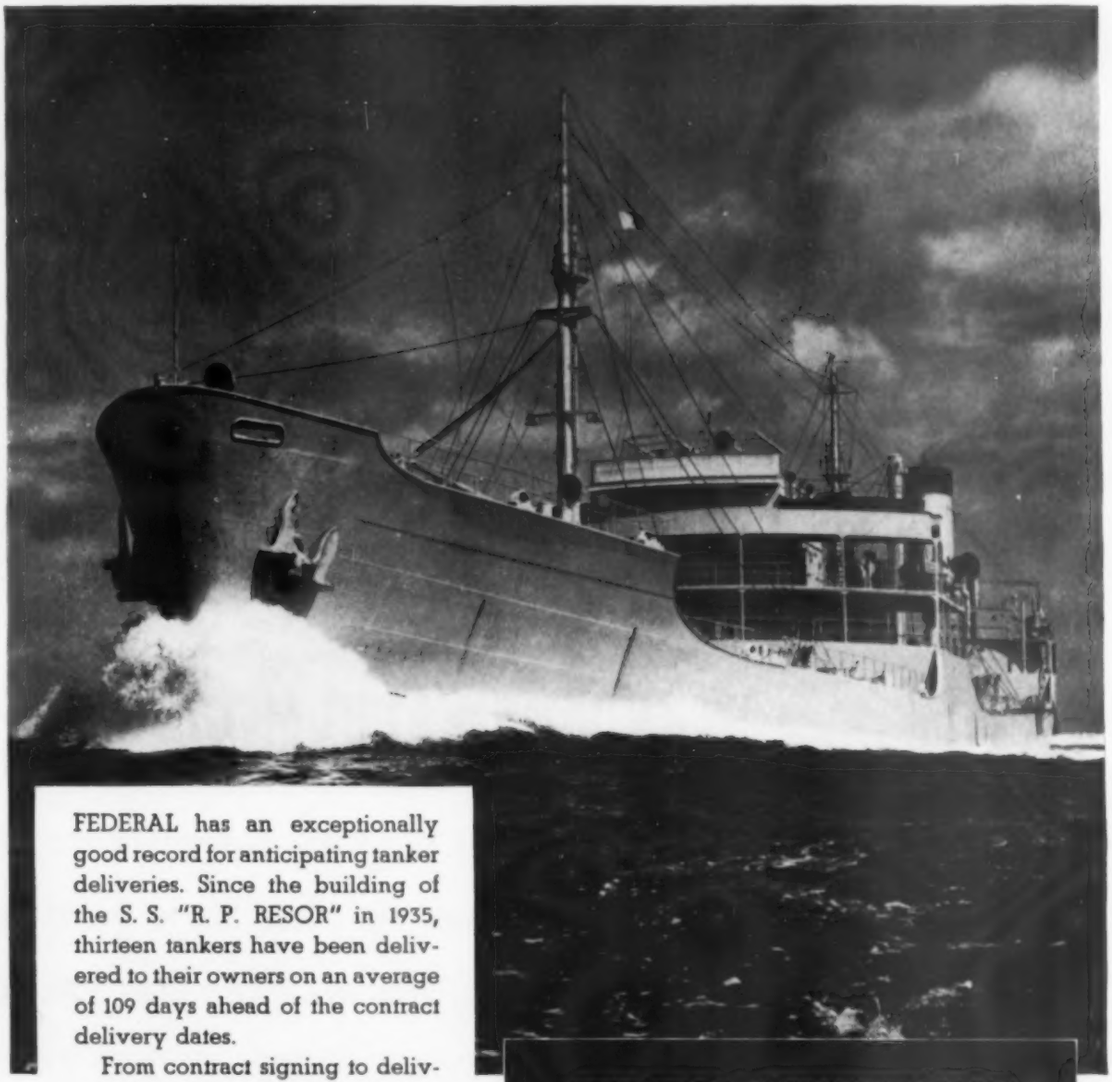
EUROPEAN REPRESENTATIVE: Compagnie Technique des Petroles, 134 Boulevard Haussmann, Paris, France.

THIS SHIP WAS BUILDING YEARS BEFORE THE CONTRACT WAS SIGNED



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From contract signing to delivery was a matter of months . . . but years of experience in building oil carriers were blended into the design and construction of each ship . . . a factor which contributes in a large degree to the efficiency and reliability that Federal built tankers are showing in service today.

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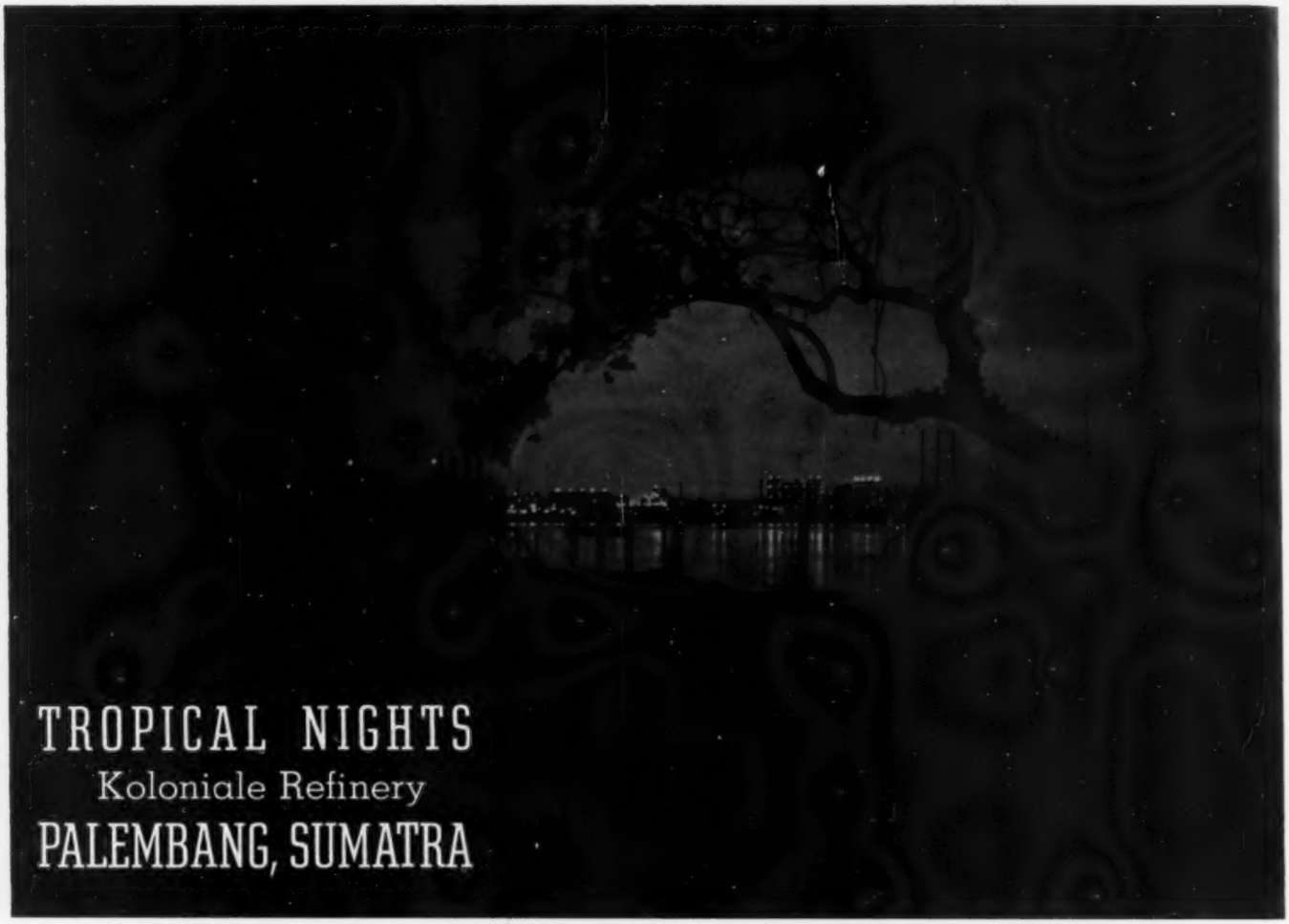

TROPICAL NIGHTS
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PALEMBANG, SUMATRA

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PRODUCERS, REFINERS, DISTRIBUTORS AND MARKETERS OF PETROLEUM PRODUCTS. DISTRIBUTION AND MARKETING FACILITIES AT ALL IMPORTANT POINTS IN THE FAR EAST, INDIA, NETHERLANDS INDIES, AUSTRALASIA, SOUTH AND EAST AFRICA.

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This policy of availability—with crews long experienced in the tropics —enables *SSC* to offer service in South America similar to its Domestic Service which has discovered more than 53 producing oil fields in its evaluation of millions of acres of leases.

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They developed oil for the first successful automobile . . . for the first Diesel engine. They've aided the textile, paper, and countless other industries by developing new products which helped make possible more efficient and economical production.

Socony-Vacuum's policy of keeping a step ahead of the times is one reason for the success of its products. Today, Gargoyle Lubricants are used in leading plants of over 100 industries. Mobiloil is the world's largest-selling motor oil, and Mobilgas is bought by **1½ million** people a day.

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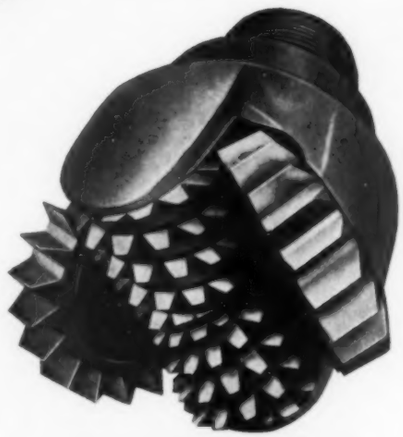
Dependability

H.C.SMITH

DRILLING TOOLS



FEATURES OF THE H. C. SMITH ROCK BIT

1. Triple bearing construction of the gauge cutters eliminates side play of cutters and insures full gauge of hole.

2. Rugged body and superior design cross cutter bearing construction permits high rotational speed and heavy loads—when desirable.

3. Cutter assemblies designed to utilize the maximum cutting surfaces of all individual cutters.

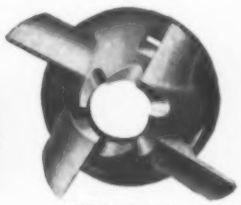
4. More circulation provided through large slush tubes on side cutter and fan-tail circulation along cross cutters prevents "balling" of bit. Large openings around cutters permits quicker displacement of cuttings from bottom of hole.

5. H. C. Smith Rock Bits cut straight holes because the concave construction of the cross cutters allows a cone to form in the center of the hole which acts as a centering guide for the bit.

Foreign Operators: DULL CUTTERS ON H. C. SMITH ROCK BITS CAN NOW BE REPLACED WITH NEW CUTTER ASSEMBLIES IN YOUR OWN SHOPS AT A SUBSTANTIAL SAVING

WRITE FOR DETAILED INFORMATION

Hard Formation Cutter Head



Soft Formation Cutter Head

H. C. Smith T-39 Wire Line Core Drill

FEATURES OF THE H. C. SMITH T-39 WIRE LINE CORE DRILL

1. Simple and positive locking of inner barrel while coring and retrieving of barrel after coring operation is completed.

2. Improved bearings in cutters which allows longer hours on bottom without loss of hole gauge.

3. Heavier pins and body construction for increased safety.

4. Improved double core catcher.

5. Floating inner barrel.

6. Hard and soft formation cutter heads are interchangeable on core drill.

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H C Smith Oil Tool Co.

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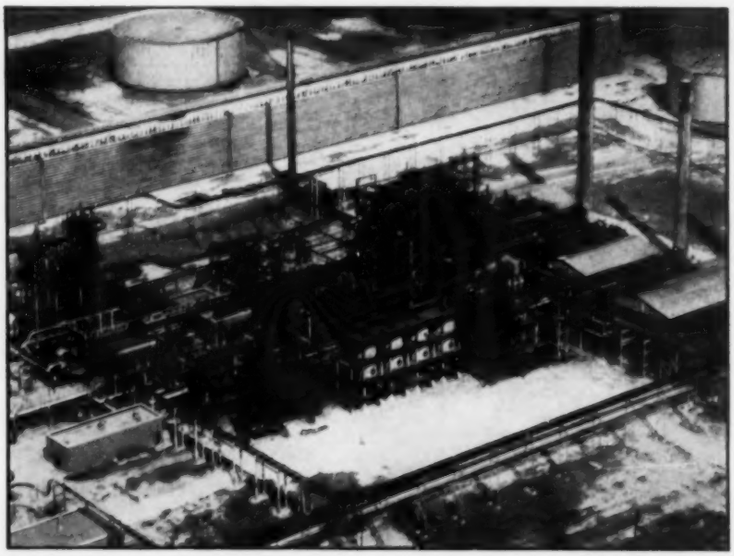

GRAY

THE GRAY PROCESS OFFERS REFINERS DISTINCT ECONOMIC ADVANTAGES

Gray Clay Treating is equally satisfactory whether the plant has a capacity of 200 or 30,000 barrels per day.

The initial investment is low. The units are simple in design—resulting in low operating and maintenance costs.

A uniform high quality, low gum content motor fuel is produced without loss of octane number.

THE GRAY PROCESSES CORPORATION

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CLAY TREATING

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W. A. Bechtel Co. and H. C. Price Co. who participated in the construction of the Mene Grande Oil line announce that they have established permanent headquarters in Eastern Venezuela and are maintaining a complete organization there for all classes of pipe line and oil field construction.

W. A. BECHTEL CO. — **H. C. PRICE CO.**

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San Francisco — New York — Bartlesville, Okla.

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MEASUREMENT ENGINEERS

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"A good instrument—accurate, rugged . . . one that takes care of itself!" is what each brand name means to the engineer or maintenance man. Known as the most economical instruments that can be purchased, wherever low cost per year (coupled with performance) is an important consideration! For example:

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AMERICAN METER COMPANY

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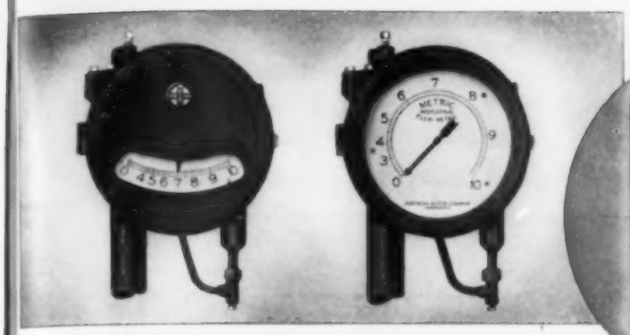
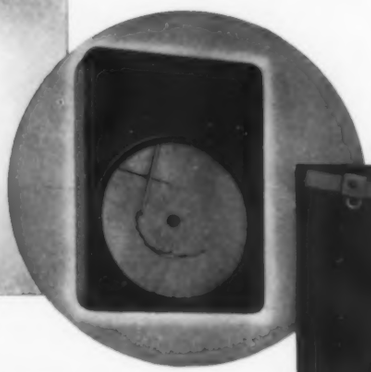
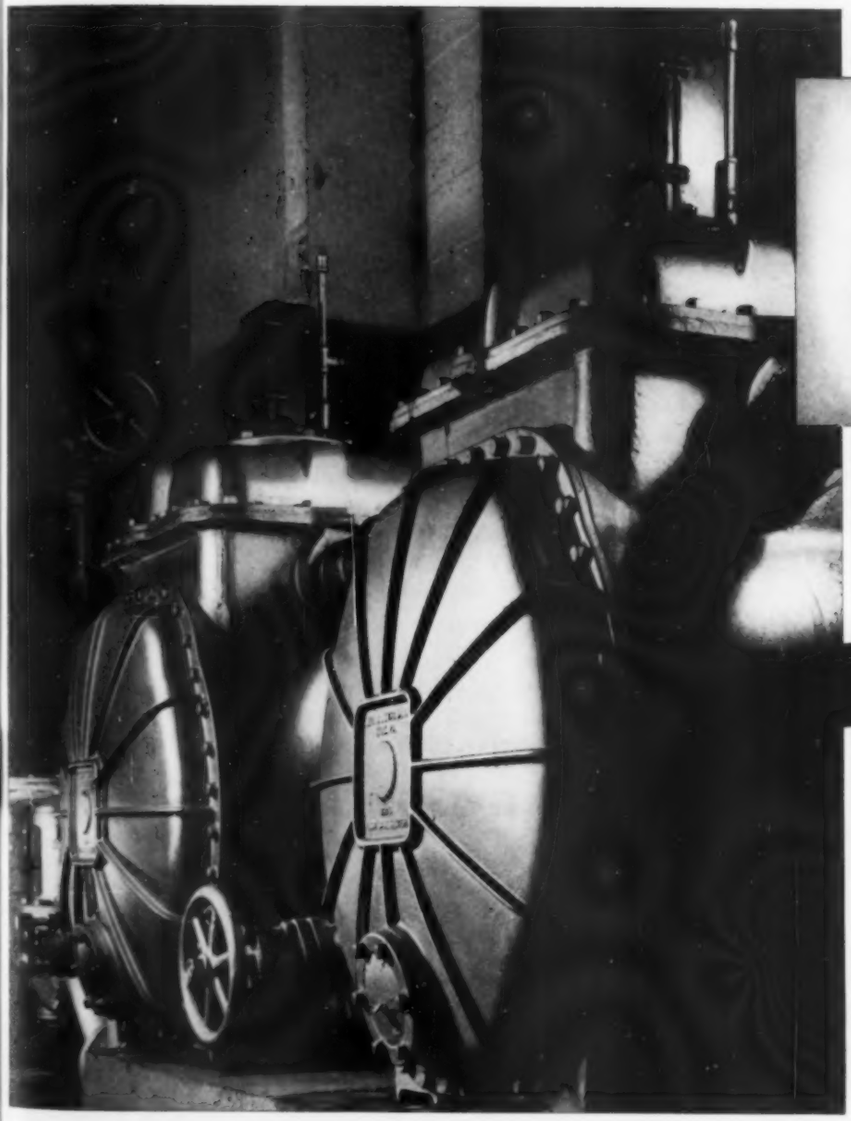




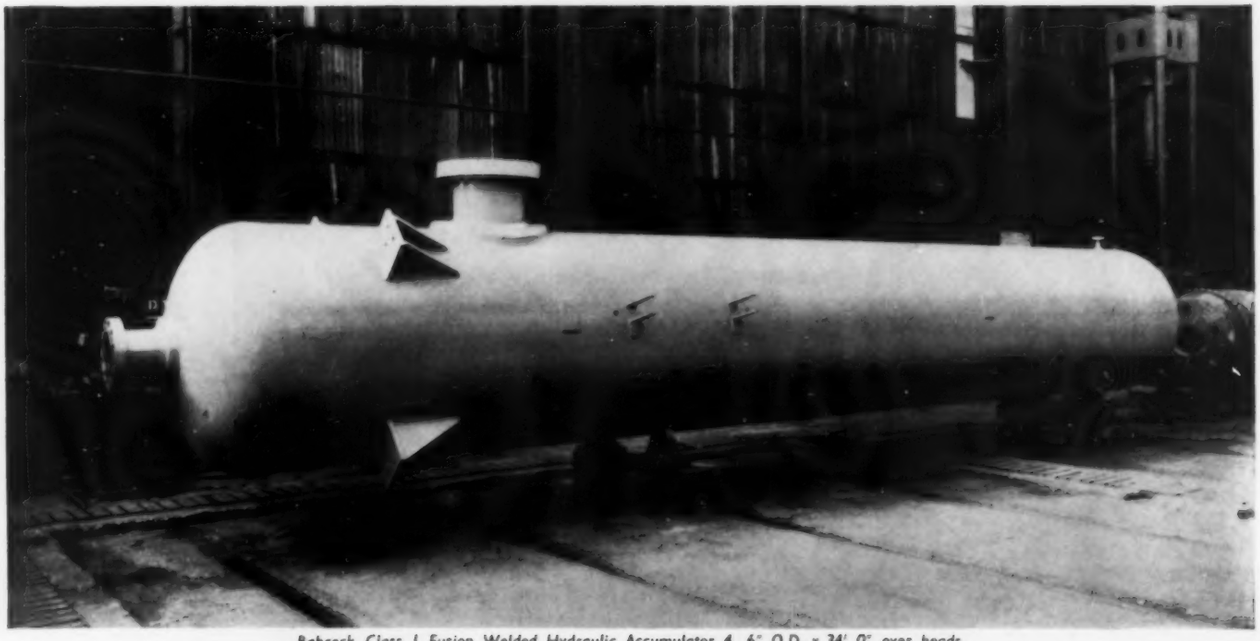
BRANDS

and oil men look for!



RELIANCE-AMERICAN

PRESSURE VESSELS



Babcock Class I Fusion Welded Hydraulic Accumulator 4' 6" O.D. x 34' 0" over heads. Working Pressure 1320 lbs. sq. in. Manufactured in our Renfrew Works, Scotland.

A Venezuelan installation of Babcock & Wilcox oil fired water tube boilers

EVERYTHING FOR THE BOILERHOUSE
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Babcock Fusion Welded Pressure Vessels are designed in accordance with Lloyd's, A.S.M.E., and other codes, and are accepted by the leading Insurance Companies for installation all over the world.

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Our Works are particularly well equipped to handle the construction of re-action chambers, coking chambers, flash chambers, fractionating columns, strippers, evaporators, heat exchangers, condensers and all vessels included in oil refinery and treatment plants.

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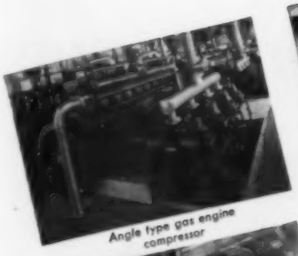
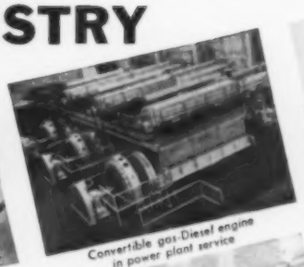
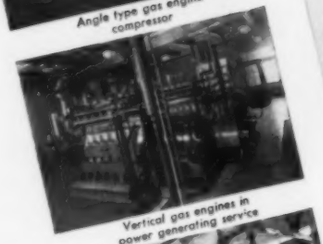
WORTHINGTON EQUIPMENT for the PETROLEUM INDUSTRY


Angle type gas engine compressor

Diesel-engine-driven hot oil reciprocating pump


Convertible gas-Diesel engine in power plant service

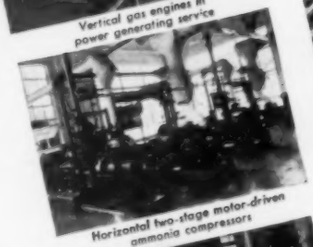
Overhead structure for Hydraulic Decoking System, on coking chambers

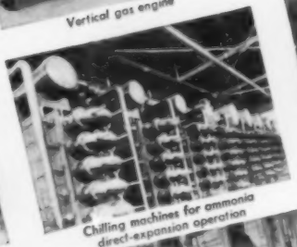

Vertical gas engines in power generating service

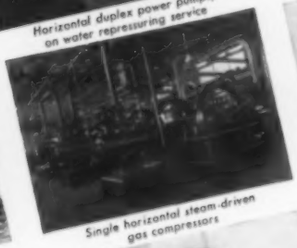
Vertical gas engine

Horizontal duplex power pumps, on water repressuring service

Gas-engine-driven compressors on natural gas pipe line


Horizontal two-stage motor-driven ammonia compressors


Chilling machines for ammonia direct-expansion operation


Single horizontal steam-driven gas compressors

Steam-turbine-driven gene-rator unit

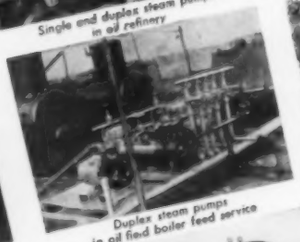
Air compressors with Multi-V-Drives

Single and duplex steam pumps in oil refinery

Rotary pump with automotive type engine drive on oil gathering line

Engine-driven centrifugal pump, water service and transfer purposes

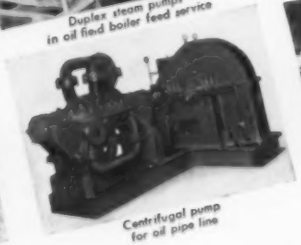
Horizontal triplex gasoline pumps


Duplex steam pumps in oil field boiler feed service

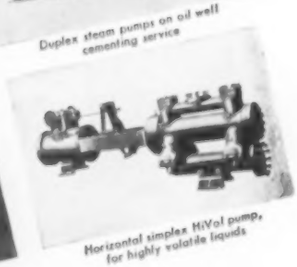
Single-stage centrifugal pumps, in gasoline and propane service

Duplex steam pumps on oil well cementing service

Gasoline-engine driven gathering pump


Centrifugal pump for oil pipe line

Centrifugal hot charge pump, driven by gas engine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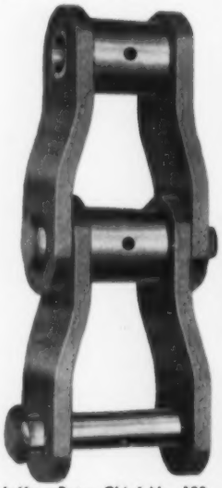

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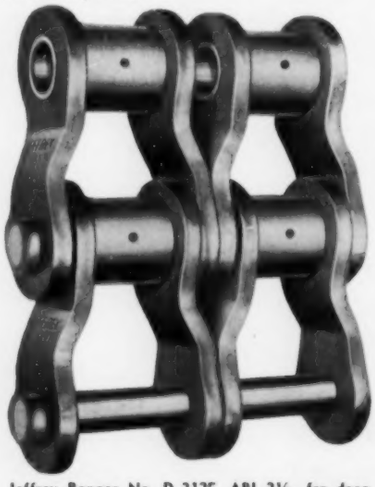

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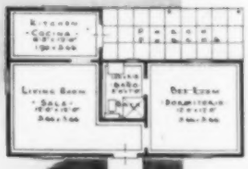

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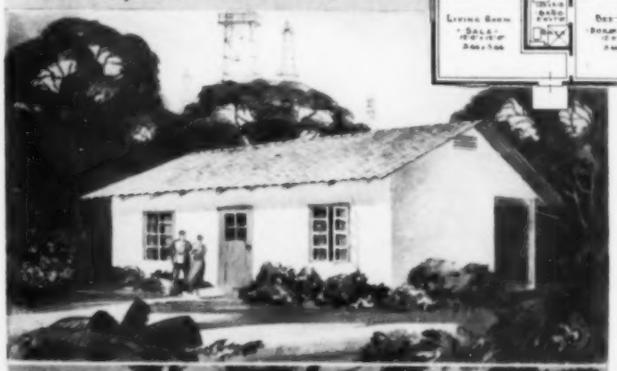

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Publisher

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Advertising Manager

VOLUME 10 **DECEMBER, 1939** **NUMBER 13**

WORLD PETROLEUM: Incorporating Petroleum Equipment Exporter

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CORRESPONDENCE

Address all correspondence regarding subscription and business matters to the Home Office; 95 River Street, Hoboken, N. J.

Editorial and Advertising offices; 56 West 45th Street, New York, N. Y. London office; 3 Savoy Place, Victoria Embankment, W.C.2.
Los Angeles office; 412 West 6th Street

SUBSCRIPTIONS

Annual subscription to World Petroleum is offered at the flat rate of five dollars (U. S.) postpaid to any country in the International Postal Union.

For the convenience of subscribers the publisher will accept payment in any of the following currencies at the fixed rate shown below:

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Subscriber's name and address should be in Roman capitals on the subscription order.

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Single copies of World Petroleum are obtainable every month, within the delay imposed by the international mail service, at any of the following agencies:

Berlin, 35, W. Germany—Verlag Chemie G.m.b. H. Corneliusstrasse 3.
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Los Angeles—412 West 6th St., telephone: Mutual 1391.

British subscribers may make payments at the London office of World Petroleum. Monthly copies, two shillings; yearly, one guinea.

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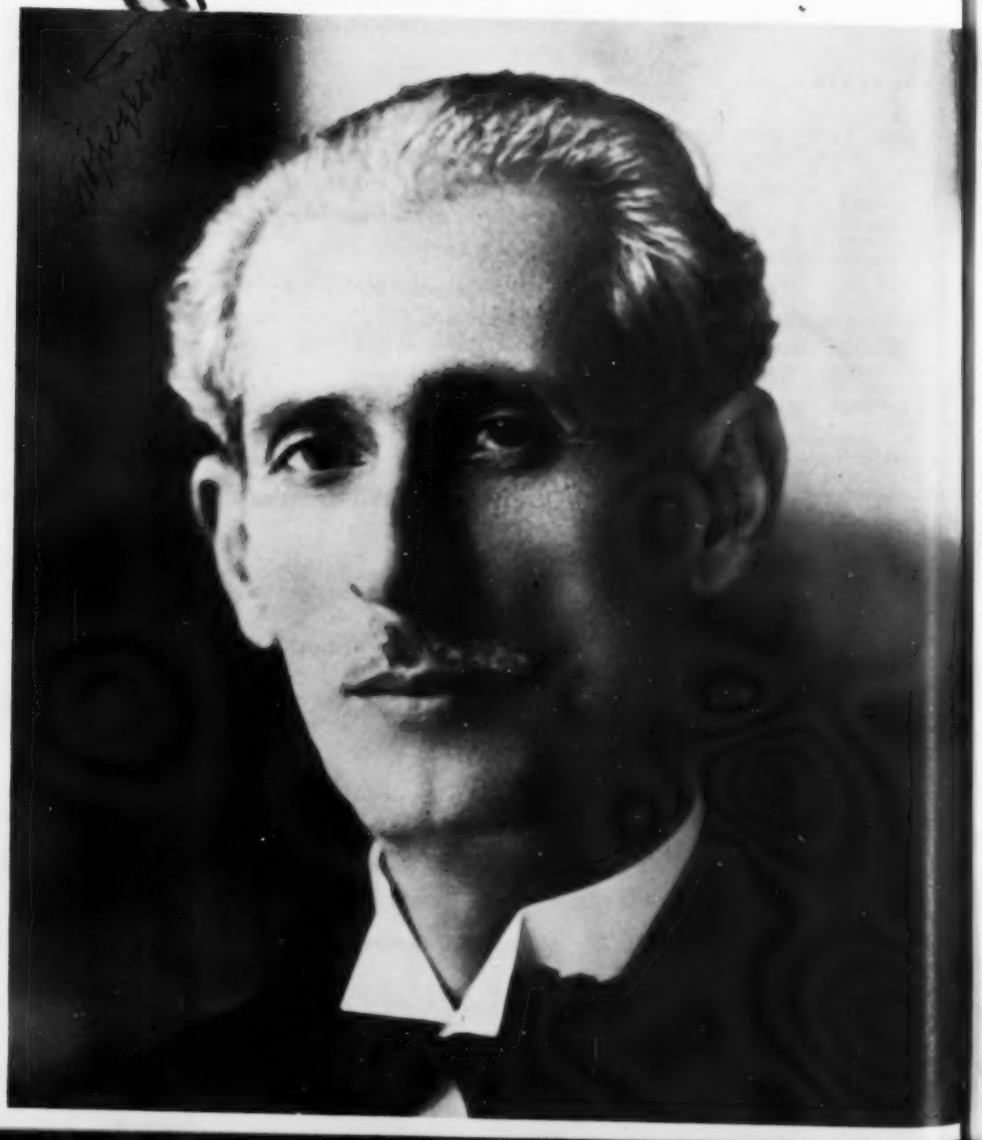


El Presidente
De La Republica De
Venezuela

EDITORIAL

VENEZUELAN PETROLEUM POLICY

By General Eleazar Lopez Contreras. ***President of the Republic***

IT was a pleasure to grant an interview to Earl W. Mayo, Jr. representative of World Petroleum during his current visit to Venezuela: I took the occasion to communicate to him, personally, the definite decision of my government to render all the aid required by the foreign organizations established in Venezuela which aspire to contribute to the economic and cultural development of this country, and also to those who have a desire to establish themselves here. I assured him at the same time that every element composing these organizations would enjoy all the individual guarantees which the democratic government over which I have the honor to preside offers and maintains.

ME fué grato recibir la visita del Sr. Earl W. Mayo, Jr., representante de esa Revista, y en ella tuve el gusto de confirmarle personalmente la definida decisión de mi Gobierno de prestar todo el apoyo que requieran aquellos organismos extranjeros establecidos en Venezuela y que aspiren a contribuir al desarrollo económico y cultural del país, así como a los que deseen venir a fijarse en él; asegurándole a la vez que sus elementos integrantes gozarán de todas las garantías individuales que ofrece y mantiene el régimen democrático que me honro en presidir.

(Exclusive statement to World Petroleum — Miraflores, 18th. September, 1939)

WHERE GOVERNMENT AND INDUSTRY WORK TOGETHER

TWENTY-FOUR years of rational development of Venezuela's petroleum resources have placed that country in an outstanding position among the oil-producing nations—first in exports, second in production after the United States and with possibilities of greatly increasing its output through the development of areas just coming into production or the location of new fields yet to be discovered.

Not only for the rapidity of its rise and the volume of its production is Venezuela conspicuous. It stands as an example of a country whose government from the beginning has observed its contractual obligations, whose courts have protected the rights alike of its own nationals and of others and where the rich revenues from the development of its resources are being devoted in the greatest possible degree to the improvement of health and living conditions.

Venezuela has been fortunate in many respects. She is fortunate in that the title to her vast subsoil wealth was vested in the state, enabling the proceeds from its development to be applied to public purposes. She is fortunate in that the early search for oil in areas unexplored and geologically unknown was conducted by companies fortified by long experience and by resources that enabled them to spend tens of millions of dollars unsuccessfully, as most of them did, before finding oil. She is fortunate in that the fair treatment extended to the oil industry has been reflected in a public spirited attitude on the part of the industry itself in providing modern sanitation, comfortable housing, and educational facilities for its workers. Perhaps the feature of the Venezuelan oil situation that most impresses the visitor today is the manner in which the oil companies and the government are cooperating in the building of needed roads, hospitals, schools, and other public works.

Changes have been made in Venezuela's petroleum law from time to time. At times, its requirements have been made so exacting that exploration was slowed down, but in general, its terms have been such that development has gone forward almost steadily. Costs of exploration and operation necessarily have been high in areas where roads had to be built before heavy equipment could be moved in and where towns had to be reared in the wilderness with houses, water and sewerage systems, hospitals, schools and the other appurtenances of modern living. Royalties and taxes are as high or higher than they are on the average in other more fully developed oil-producing regions. Combined, they provide something like 30 percent of the government's yearly resources.

In 1938 a new petroleum law was promulgated. Its effect was to suspend applications for or the issuance of concession contracts. There was discussion as to whether Venezuela had changed its successful and profitable policy regarding oil development. As has been explained by government officials, the real purpose was to provide a period during which an investigation could be made of the potentialities of areas not covered by contracts. These studies will form a basis on which new concession contracts will be issued. Venezuela, properly enough, wants to get the best terms it can in the development of its petroleum resources, but it does not wish to strangle the goose that lays its golden eggs.

Suggestions have been made in certain quarters that future concession contracts may be made more remunerative to the government. There even have been proposals, though not very strongly supported, that the government itself should compete with existing private enterprises in development of oil resources as yet undefined. The Venezuelan political mind, however, has a logical character which no doubt, will dictate a policy by which the nation will benefit to the fullest possible extent without imposing such burdens as to curtail the all-important progress of development. Any modification of the petroleum law that would retard the progressive program of public works resulting from the present close cooperation of the oil companies and the government is likely to prove unacceptable to the enlightened administration of General Lopez Contreras. An examination of the factors that have contributed to Venezuela's own exceptional financial position compared with the lessened prosperity and lowered standard of living prevailing in those countries which have attempted to dispense with the technical experience and financial resources of the international companies seems certain to lead to a continuation of development through private initiative.

Lest it be assumed that wholly idyllic conditions prevail in the relations between the oil companies and the government in Venezuela, it may be pointed out that differences of opinion do sometimes arise. Such has been the case in connection with the admission to the country duty free of machinery and supplies used by the companies in their operations. This provision was included as an integral part of the concession contracts issued to the companies. Administration officials have endeavored to limit duty free admission to articles and materials which they classify as indispensable to such operations as exploration, drilling, transportation and refining. The companies have maintained that they obviously do not import anything that is not needed in their work, and that the attempted distinctions do not properly apply.

The significant point to be noted in connection with these disputes, however, is this: In several cases that have been carried to the Supreme Court, decisions have been rendered in favor of the companies. Venezuela is a land in which the courts are not puppets but speak with unquestioned authority, and it is not to be assumed that government officials will disregard their rulings.

DONDE EL GOBIERNO Y LA INDUSTRIA TRABAJAN JUNTOS

VEINTICUATRO años de desarrollo racional de los recursos petrolíferos de Venezuela, han colocado a ese país en una notable posición entre las naciones productoras de petróleo—primero en exportación, segundo en producción después de los Estados Unidos, y con posibilidades de aumentar grandemente su producción con el desarrollo de regiones que apenas comienzan a producir o con nuevos campos todavía por descubrir.

No solamente se distingue Venezuela por la rapidez de su crecimiento y el volumen de producción. Se destaca como ejemplo de un país cuyo gobierno desde el principio ha cumplido sus obligaciones contractuales, cuyas Cortes han protegido sin distinción los derechos de nacionales y extraños, y donde las grandes entradas procedentes del desarrollo de sus recursos se están destinando en todo lo posible para mejorar la vida y las condiciones sanitarias de su pueblo.

Venezuela ha sido afortunada por varios aspectos. Ha tenido la buena fortuna de que la propiedad de la vasta riqueza de su subsuelo haya quedado investida en el Estado, permitiendo así que las ganancias provenientes de ese desarrollo se puedan dedicar a proyectos públicos. Es afortunada porque los primeros pasos en busca de petróleo, en regiones no exploradas, y desconocidas geográficamente, fueron dados por compañías fortalecidas por una larga experiencia y dotadas de capitales que les permitían gastar millones y millones de dólares sin éxito, como casi todas tuvieron que hacer, antes de dar con el petróleo. Es afortunada en que el justo tratamiento acordado a la industria petrolera se ha reflejado en una actitud de espíritu público por parte de la industria misma, en el sentido de proveer higiene moderna, habitaciones confortables y facilidades para la educación de todos sus obreros. Talvez el aspecto de la situación petrolera que llama más la atención del visitante hoy, es la forma en que las compañías petroleras y el gobierno están cooperando en la construcción de caminos, hospitales, escuelas y otras obras públicas muy necesarias.

La ley de petróleos de Venezuela ha sufrido cambios de tiempo en tiempo. A veces sus demandas han sido tan fuertes que las exploraciones se han tenido que atrasar, pero en general, los términos de ella, han permitido que progreso siga su marcha, casi constantemente. Los costos de exploración y operación necesariamente han sido altos en regiones en donde se tuvieron que construir caminos para poder llevar los pesados equipos que se necesitaban para comenzar los trabajos, y en donde hubo que crear ciudades en las mismas selvas, dotándolas con casas, sistemas de acueducto y alcantarillado, hospitales y otras facilidades necesarias para la vida moderna. Las regalías y los impuestos son tan altos y aun más altos que en el promedio de otras regiones productoras de petróleo, más desarrolladas. Combinadas, esas entradas producen algo así como el 30% de las rentas anuales del gobierno.

En 1938 se promulgó una nueva ley de petróleos. Su efecto fue suspender las solicitudes y el otorgamiento de contratos de concesión. Hubo discusiones sobre si Venezuela había cambiado su afortunada y ventajosa política en relación con el desarrollo de los petróleos. Según lo han explicado los oficiales del Gobierno, el verdadero propósito de la ley es proveer un período durante el cual pueda llevarse a cabo una investigación de las potencialidades de las regiones no abarcadas por contratos. Estos estudios constituirán la base para el otorgamiento de nuevas concesiones. Venezuela naturalmente aspira a obtener las mejores condiciones posibles para el desarrollo de sus recursos petrolíferos, pero no desea acabar con la gallina de los huevos de oro.

En ciertas partes se han hecho sugerencias sobre que los nuevos contratos de concesión pueden hacerse en forma más ventajosa para el Gobierno. Aun ha habido propuestas, no muy firmemente apoyadas sin embargo, de que el Gobierno mismo compita con las empresas privadas en el desarrollo de los recursos petrolíferos que estén todavía sin definirse. La mente política venezolana, sin embargo, tiene la caraterística de la lógica, la que sin duda, la ayudará para dictar una política mediante la cual pueda la nación beneficiarse lo más posible sin imponer cargas que entorpezcan el importantísimo progreso de desarrollo. Cualquier modificación a la ley de petróleos que pueda tender a retardar el programa de obras públicas que resulta de la estrecha cooperación actual entre las compañías petroleras y el Gobierno, muy posiblemente resultará inaceptable para la inteligente administración del General López Contreras. Un examen de los factores que han contribuido a la excepcional situación financiera de Venezuela, en contraste con la menor prosperidad y las más bajas condiciones de vida que prevalecen en los países que han tratado de prescindir de la experiencia técnica y de los recursos financieros de compañías internacionales, casi con certeza conducirá a que se continúe el desarrollo por iniciativa privada.

Para que no se crea que prevalecen condiciones absolutamente idealistas en las relaciones entre las compañías petroleras y el Gobierno, puede anotarse que a veces se presentan diferencias de opinión. Tal es el caso relativo a la entrada al país libre de derechos, de maquinaria, y artículos usados por las compañías en sus operaciones. Esta claúsula fue incluida como parte integral de los contratos de concesión otorgados a las compañías. Los oficiales administrativos han tratado de limitar esta excención de derechos a artículos y materiales que clasifiquen ellos como indispensables para las operaciones de exploración, perforación, transporte, y refinería. Las compañías han sostenido que ellas naturalmente no importan nada que no sea necesario para sus trabajos, y que las distinciones que se han tratado de hacer no les son verdaderamente aplicables.

El punto significativo que debe tenerse presente en relación con estas disputas, sin embargo, es éste: En varios casos llevados a la Corte Suprema, se han obtenido decisiones en favor de las compañías. Venezuela es un país en donde las Cortes no son muñecos sino que hablan con indisputable autoridad, y no es de suponerse que los oficiales del gobierno desoirán sus sentencias.

Enlightened Self Interest Basis of Government Policy

By Dr. Manuel R. Egana, *Minister of Fomento*

Administrative activities of the Venezuelan government, so far as they pertain to petroleum, are in the hands of the Minister of Fomento. In a country where oil contributes a large proportion of the national revenue and is the mainstay of export trade this, naturally, is a very important position. Dr. Manuel R. Egana, who holds this post in the present cabinet of President Lopez Contreras, is a man of rare ability who has made a distinguished record, especially in the field of finance. Dr. Egana has graciously consented to give in the following article a statement of his personal views as to governmental policy and administration of the oil laws. This statement emphasizes as salient points the observance of established rights and the safeguarding of the nation's interests in connection with future oil development.—*Editor.*

AT THE time when it took charge of the national destinies, the government of the citizen General Eleazar Lopez Contreras outlined a program of action and an objective to be attained in all administrative activities, including, of course, those in charge of the Minister of Fomento. This program for action, this policy of the present government, has been announced in the speeches and the reports of the President of the Republic to the Venezuelan people, and in his messages to the National Congress. These documents set forth consistently and harmoniously the precise direction which Governmental action is to take toward the study and solution of the problems laid at the door of the Minister of Fomento. The various aspects of the policy which the government is developing may be summed up in the single postulate: The action of the Public Authority will be directed toward a fulfillment of the right of the state to the largest practicable participation in the riches of our subsoil, and to use the economic benefits obtained therefrom to improve our population qualitatively and quantitatively, and to promote and strengthen the other productive activities of the country.

The messages of the First Magistrate and the reports of my predecessor, have fully established the extraordinary advantages obtained by the country from the petroleum concessions granted during the past three years. However, at the beginning of 1938 the executive decided to suspend further grants, "in view of what the government contemplates" as expressed by Minister Perez, "which is to employ all means in its power to obtain a better knowledge of the real value of our lands, in order that we may draw from them the maximum advantage for the nation." The Minister of Fomento has begun the preliminary study of extensive free zones, but it will not be until the next fiscal year (1940) that we shall be able to accomplish much on this subject. For this purpose adequate facilities have been requested for a study of a section including the States of Cojedes, Barinas, Portuguesa and Apure, which comprises a surface area of 4,694,000 hectares. It is superfluous to remark that such an enterprise cannot be accomplished between sunrise and sunset, nor by spending merely a handful of bolivares. It will require much time, much labor, and much money to arrive

(Continued on page 48)

The country club at Caracas against a beautiful background of mountains partly obscured by the rain clouds

La política del Gobierno está basada en un inspirado interés propio

Por el doctor Manuel R. Egaña, *Ministro de Fomento.*

Las actividades administrativas del gobierno venezolano, en lo tocante al ramo de petróleos, están en manos del Ministerio de Fomento. En un país donde el petróleo representa una gran proporción de las rentas nacionales y es el renglón más fuerte de exportación, el cargo de Ministro de Fomento es naturalmente muy importante. El doctor Manuel R. Egaña, quien lo desempeña en el Gabinete actual del Presidente López Contreras, es una persona de rara habilidad, que ha hecho una brillante carrera, especialmente en el campo de finanzas. El doctor Egaña ha consentido amablemente en expresar en el siguiente artículo, sus puntos de vista personales en relación con la política del Gobierno y la administración de las leyes sobre petróleos. En ese artículo se recalcan, como puntos salientes, el respeto a los derechos establecidos y la protección de los intereses de la nación en conexión con el futuro desarrollo petrolífero.—*Editor.*

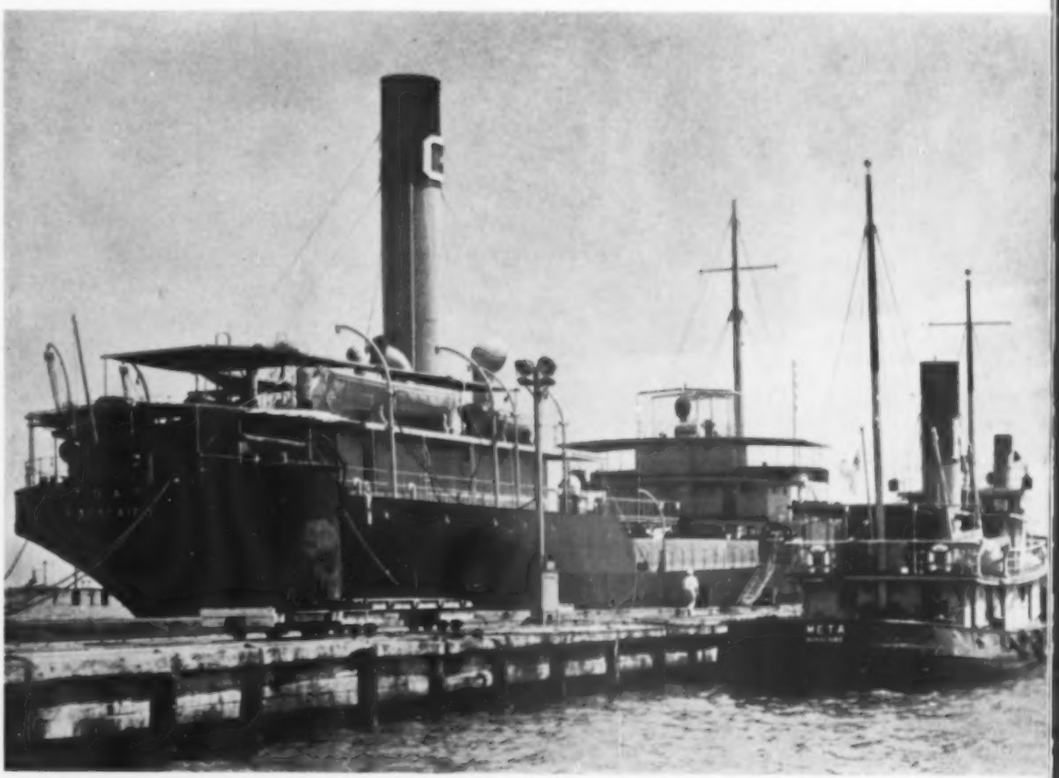
Desde su iniciación al frente de los destinos nacionales, el Gobierno del ciudadano General Eleazar López Contreras, se trazó un programa de acción, un objetivo que alcanzar, en todas las actividades administrativas, y por consiguiente, en las que cumple por órgano del Ministerio de Fomento. Ese programa de acción, esa política del Gobierno actual, aparecen consignados en las Alocuciones y Exposiciones del Presidente de la República al pueblo de Venezuela y en sus Mensajes al Congreso Nacional. Tales documentos exponen de un modo consecuente y armonioso la dirección precisa que orienta la acción gubernamental en el estudio y resolución de los problemas reservados al Ministerio de Fomento. Los diversos aspectos de la política que el Gobierno desarrolla, pueden concentrarse en el siguiente postulado: La acción del poder público debe dirigirse a la realización del derecho que tiene el Estado a la mayor participación posible en la riqueza de su subsuelo y a aprovechar el beneficio económico que de ella obtenga para aumentar cualitativa y cuantitativamente nuestra población y fortalecer las demás actividades productoras del país.

Los mensajes del Primer Magistrado y las Memorias de mi predecesor han establecido claramente las ventajas extraordinarias obtenidas para el país en las concesiones petrolíferas otorgadas en los últimos tres años. Sin embargo, a principios de 1938, el Ejecutivo decidió suspender su otorgamiento "en razón de que el Gobierno trata" como lo expresó el Ministro Pérez "por todos los medios a su alcance de obtener un mejor conocimiento del verdadero valimiento de nuestras tierras, para sacarles el mayor provecho en beneficio de la Nación". El Ministro de Fomento ha iniciado los estudios preliminares de extensas zonas libres, pero será en el próximo año económico cuando podrá llevar a cabo una intensa labor en tal sentido. A tal efecto se pedirá un crédito para estudiar una sección de los Estados Cojedes, Barinas, Portuguesa y Apure que abarca una superficie libre de 4.694.600 hectáreas. Conviene advertir, desde luego, que la labor empezada no es de las que se realizan de la noche a la mañana, ni con un puñado de bolívares. Se necesita mucho tiempo, mucho trabajo y mucho dinero para lograr un conocimiento aproximado de la potencialidad petrolífera de una región.

Ahora bien si en verdad la empresa es difícil y arriesgada, por cuanto los técnicos en la materia asientan que se sabe dónde no hay petróleo pero no puede saberse dónde lo hay, sino cuando un taladro ha dado resultado satisfactorio, el acometerla está justificado por el extraordinario valor que adquirirá la zona, en caso de obtenerse siquiera indicios favorables. La posición del

(Pasa a la pagina 49 col. 2)

Gulf loading pier at Lagunillas: Lake Maracaibo is one of the world's important shipping centers.



at an approximate knowledge of the petroleum possibilities of a whole region.

However, while the enterprise is difficult and not without risk, seeing that experts in the matter are able to say where there is no oil, but are unable to say where the oil is until a drill has given a satisfactory answer, the undertaking is justified by the extraordinary value which the region will acquire in case favorable indications are obtained. The state will obviously be in a much better position in its bargaining with applicants for concessions, and may even be in a position to undertake exploitation directly, or on a partnership basis such as is authorized by the new petroleum law.

Parallel with this resolve of the government to obtain the most exact knowledge possible of the oil potentialities of the country, the work of recovering earlier undeveloped concessions is being carried on. During 1938, orders were issued extinguishing concession rights over an area of 3,879,553.44 hectares. In the first three months of the present year, similar orders were applied to exploration rights on 5,263,293.49 hectares, and at the present time the Bureau in charge is actively studying all concessions for operation which may be susceptible to cancellation for legal reasons.

As regards the legal status of concessions granted in former times, when petroleum was an unknown subject, when the country had no knowledge or experience, and no vision in the matter, the Minister of Fomento will continue to respect all rights legitimately acquired. This without prejudice to a policy designed to promote a situation thoroughly consonant with the principles of equity, and consistent with a just participation by the nation in the riches of the subsoil.

As is well known, the complementary rights in the form of exemption from import duties which are granted by the law to persons holding oil concessions have been an occasional source of litigation. In this matter the Ministry has at all times endeavored to take a rational view both of the necessities of the petroleum industry and the superior interests of the Republic and the necessities of the oil industry. The government has applied a firm review and administrative control which has resulted in reducing to real and just limits the exercise of this prerogative, which is of such great importance to the economic life of the country.

In 1938 the total production of petroleum was 28,071,373.376 metric tons, of which there were exported 94.92 percent, or 26,645,-921.227 metric tons. These figures place Venezuela in the first place among countries that export petroleum. And considering the importance of this mineral in modern life, it is logical to conclude that the attitude of Venezuela toward its petroleum problems cannot be a matter of indifference to the rest of the world.

With the idea of promoting the refining of petroleum within the country itself, the government has insisted, as one of the advantages to be gained in the granting of concessions during the past three years, on the establishment of various refineries. On August 25, 1936, negotiations were begun between the Minister of Fomento and the Standard Oil Co. of Venezuela, which resulted in an agreement signed on December 20, 1938, and under the terms of which that company took the obligation to build a refinery at a point situated near the junction of the Rio Caripe with the Rio San Juan, in the Piar district of the State of Monagas; this refinery will have an operating capacity of not less than 2,385 cubic meters (15,000 bbl.) of crude

The Majestic hotel, well known to Caracas visitors

petroleum per day. Another concern, the Venezuelan Oil Development Co. has recently completed through the Caribbean Petroleum Co. another agreement for enlargement of the San Lorenzo refinery, which increases the capacity of this plant by 2,000 cubic meters (13,000 bbl.) daily.

It is expected that in the course of this year, as a result of the intense activity now going on in the east of the Republic, there will be a considerable increase in the country's production of petroleum. Already at the end of 1938 the Standard Oil Company of Venezuela had discovered the Jusepin field east of Maturin which produces light crude oil; the crudes produced by the Mene Grande Oil Company, C. A. in Oficina and Santa Ana are distinguished by their excellent quality; among the important undertakings accomplished by this company was the construction of a 16-in. oil pipeline between the Oficina fields and the Caribbean sea, a distance of about 160 kilometers. Puerto La Cruz is destined to be one of the most important petroleum ports of the world.

Characteristic of the capital is this corner of the Plaza Bolivar

Estado será mucho mejor evidentemente, ya sea frente a aspirantes a concesiones, ya sea en el caso de que resuelva emprender directamente la explotación o en participación como lo autoriza la nueva Ley de Hidrocarburos.

Paralelamente a este designio del Gobierno de obtener un conocimiento, el más aproximado posible, de la potencialidad petrolera del país, viene cumpliendo una tenaz labor de recuperación de lotes concedidos anteriormente. Durante el año de 1938 se dictaron resoluciones extintivas de derechos de concesionarios sobre una superficie de 3.879.553.-44 hectáreas. A manera de complemento me permito consignar que en los tres primeros meses del corriente año se han dictado también Resoluciones extintivas de derechos de exploración sobre 5.263.293.49 hectáreas y que en la actualidad se ocupa activamente el despacho de estudiar la extinción de derechos sobre todas las concesiones de explotación que por cualquier causa legal sean susceptibles de tal medida.

Cabe también señalar especialmente la resolución de un convenio celebrado con la Compañía Anónima Petróleos y Minerales de Venezuela, resolución en virtud de la cual readquirió el Estado la plena disponibilidad de 490.656 hectáreas de terreno muy probablemente petrolífero o al menos de gran valor en opinión de los técnicos del Ministerio.

Con respecto al status jurídico de las concesiones otorgadas en épocas anteriores, cuando el petróleo era una incógnita, cuando el país no tenía conocimiento ni experiencia, ni visión alguna en la materia, el Ministerio de Fomento ha venido y continuará respetando los derechos legítimamente adquiridos, sin perjuicio de tener como desideratum una situación más cónsona con los principios de equidad, consistente en una justa participación de la Nación en la riqueza de su subsuelo.

Como es bien sabido, las exoneraciones de derechos de importación que con el carácter de derechos complementarios acuerda la Ley a los concesionarios de hidrocarburos, han sido una fuente ocasional de litigios, por cuanto el Ministerio se ha estorazado en todo momento, por establecer un criterio racional que contemple tanto las necesidades de la industria petrolera, como los superiores intereses de la República. En esta forma el gobierno ha opuesto una serena y firme elaboración doctrinal que, aplicada sistemática y simultáneamente con un celoso control administrativo, tiende a reducir a sus verdaderos y justos límites el ejercicio de esta prerrogativa de tanta significación para la vida económica del país.

La producción total de petróleo fue en 1938 de 28.071.370.376 toneladas métricas, de la cual se exportó el 94.92%, o sean 26.645.-921.227 toneladas métricas. Esta cifra coloca a Venezuela en el primer lugar entre los países exportadores de petróleo. Y atendida la importancia que tiene este mineral en la vida moderna, es lógico concluir que la actitud de Venezuela en relación con sus problemas petroleros, no puede ser indiferente al mundo.

Ha sido con el propósito de fomentar la refinación de petróleos en el propio país,

Air transportation plays a vital role in the development of Venezuela's resources

que el Gobierno ha estipulado como una de las ventajas especiales en el otorgamiento de concesiones durante los últimos tres años, el establecimiento de diversas refinerías. Y fue en ejecución de un convenio otorgado entre el Ministerio de Fomento y la Standard Oil Company of Venezuela, el 25 de Agosto de 1936, que se celebró el de 20 de diciembre próximo pasado, por el cual se precisó la obligación de esta empresa de construir una refinería en un lugar situado cerca de la confluencia del Río Caripe con el Río San Juan, en el Distrito Piar del Estado de Monagas, con una capacidad de manipulación no menor de dos mil trescientos ochenta y cinco metros cúbicos de petróleo crudo, o sea quince mil barriles por día. Otra empresa, la Venezuelan Oil Development Company ha concluido recientemente, por intermedio de la Caribbean Petroleum Company, otro convenio para el ensanche de la Refinería de San Lorenzo, locual aumentará la capacidad de la planta a 2.000 metros cúbicos (13.000 barriles) diarios.

Es de esperarse que en el curso de este año, como resultado de las intensas actividades que se llevan a cabo en el Oriente de la República, aumente considerablemente la producción de petróleo en el país. Ya a fines del año de 1938, la Standard Oil Company of Venezueza descubrió el campo de Jusepín hacia el oeste de Maturín, productor de petróleo liviano; los petróleos de la Mene Grande Oil Company C. A. en Oficina y Santa Ana se destacan por su excelente calidad, y entre las actividades de importancia realizadas por esta Compañía pueden mencionarse los trabajos de construcción de una carretera y un oleoducto de 16 pulgadas entre los campos de Oficina y el Mar Caribe con una distancia aproximada de 160 kilómetros. Puerto La Cruz está llamado a ser uno de los puertos petroleros más importantes del mundo.

RATE OF DEVELOPMENT Reflects Government Oil Policy

By Henry J. Allen*

WHEN I talked with President Eleazar Lopez Contreras of Venezuela I found that among his chief concerns was the improvement of the health sanitation and education of his people. Among the heads of government departments and local officials it was the same. With pride they pointed out new sewage systems, hospitals and schools that are being constructed in all parts of the country.

It is natural enough for public officials to be particularly interested in public works with which they are more or less closely concerned. What impressed me even more forcibly however was the fact that on visiting an oil camp in the eastern part of the Republic, a part that is new in the sense that its industrial development is just getting under way, I found that these same subjects were main topics of conversation. At a reception attended by members of the operating staff of a great oil company that is spending millions of dollars yearly in exploration and drilling I listened to the casual discussion of a group of ten or a dozen men. It related mainly to the affairs of the local schools and hospitals, to the improvement in the living conditions of Venezuelans employed at the camp. They talked of workers who had started in some humble capacity who were making progress in engineering, drilling, driving tractors, making brick or in other construction activities.

My mind went back to my interview with the President and to the cordial way in which he had spoken of the cooperative spirit with which the oil companies had responded to his plans for improved living conditions in that industry, to the credit he had given them for building schools and hospitals and over 6,000 modern homes for their workers and for fostering a better feeling between labor and capital. It boded well, I thought, both for the people of Venezuela and for the business interests engaged in developing the great resources of the country that this spirit of appreciation and cooperation should exist. The capital that is adding to the wealth and income of Venezuela, particularly in such enterprises as oil field development which requires a tremendous investment before even a beginning can be made in realizing returns, necessarily comes largely from outside the country. But those who supply this capital and those who direct its expenditure do not regard themselves as aliens. They realize that in the long run their own interests are bound up with the progress and prosperity of the country and so they stand willing to support all those investments which tend toward national betterment so far as these proceed along sound economic lines.

By force of circumstances the oil companies led the way in improved sanitation and living conditions in many parts of Venezuela. Oil is where one finds it and the places where it is found do not always, or commonly, comply to the conditions of a natural health resort. Camps were carved out of the jungle in districts where malaria and other tropical diseases prevailed. Experience has shown, as notably in the building of the Panama Canal, that in the tropics great enterprises cannot be carried to success unless the health of the worker is safeguarded. Men afflicted with malaria or other wasting diseases cannot do efficient work. It was a matter of necessity for companies operating in remote places where many of the oil camps were situated to provide medical care.

Dwellings likewise had to be built to house the workers. With the background of the builders and the ideas that they had brought with them as to home comforts it was natural that these houses should be of substantial construction and equipped with modern conveniences. As villages grew up it was logical to establish a school and later on a hospital for the better treatment of injuries or disease. Thus, by the same process that has taken place in thousands of communities in the United States, provision for better living, better health and better education came into existence in the oil towns of Venezuela. With the active support of the government this movement is now being extended to all parts of the country and to communities far removed from oil industry activities.

In other directions too the oil companies have contributed to the material progress of Venezuela. One of the handicaps to the development of the country was the lack of transportation facilities and particularly the dearth of good roads. In order to move to their isolated camps and fields the heavy equipment needed for drilling wells and conveying oil, the companies had to build roads. These highways, of course, are available for

(Continued on page 52)

*Mr. Henry J. Allen, the well-known Kansas editor, publicist and statesman, is embodying the results of his extensive travels and observations in Venezuela in a book which will be published early next year by Doubleday Doran and Company.

Left, swimming pool and club house with outdoor dance floor and air conditioned office building in background at the Lago Petroleum Corp. camp at Maracaibo: Opposite, Punta Gorda power station of Lago on the shore of Lake Maracaibo.

La rapidez del desarrollo de la industria refleja la política petrolera del Gobierno

Por Henry J. Allen.

CUANDO conversé con el General Eleazar López Contreras, Presidente de Venezuela, encontré que, entre sus principales preocupaciones, estaba la de mejorar la salud, higiene y educación de su pueblo. El mismo propósito se notaba entre los jefes y oficiales de las varias dependencias del Gobierno. Con orgullo se me mostraron nuevos sistemas de alcantarillados, hospitales y escuelas que se están construyendo en todo el país.

Es natural que los personajes oficiales se interesen particularmente en las obras públicas con las que están, más o menos estrechamente, vinculados. Lo que más me llamó la atención, sin embargo, fue que, al visitar un campamento petrolero en la parte oriental de la república, que es nueva en el sentido de que su desarrollo comercial está apenas comenzando, encontré que los mismos asuntos constituían el principal tópico de conversación. En una recepción, a la que concurrieron los empleados de una gran compañía de petróleos que, está gastando millones de dólares anualmente en exploraciones y perforaciones, tuve ocasión de escuchar la discusión casual de un grupo de diez o doce personas. Se refería principalmente esa conversación a asuntos de las escuelas locales y de los hospitales, a la mejora de las condiciones de vida de los venezolanos empleados en el campo. Se hablaba de trabajadores que habían comenzado en humildes condiciones y que, hoy estaban haciendo progresos en ingeniería, perforaciones, manejo de tractores, hechura de ladrillos, y otras actividades en el ramo de construcciones.

Me acordé entonces de mi entrevista con el Presidente, y de la forma cordial en que me había hablado sobre el espíritu de cooperación con que las compañías petroleras habían respondido a sus planes para el mejoramiento de las condiciones de vida en esa industria, de cómo él, había dado crédito a esas empresas por la construcción de escuelas y hospitales y de más de 6.000 casas modernas para sus trabajadores, y por fomentar un mejor sentimiento entre el capital y el trabajo. Buen presagio—pensé—para el pueblo de Venezuela y para las empresas comerciales que se están ocupando en desarrollar los grandes recursos del país, que exista éste espíritu de entendimiento y de cooperación. El capital que está contribuyendo al aumento de la riqueza y de las rentas de Venezuela, particularmente en aquellas empresas que, como la del desarrollo de petróleos, requieren una inversión enorme, mucho antes de poder comenzar siquiera a realizar ganancias, tiene que venir necesariamente, en gran parte, de fuera del país. Pero, los que suministran ese capital y los que dirigen su inversión, no se consideran a sí mismos como extranjeros. Ambos comprenden que, a la larga, sus propios intereses están ligados al progreso y prosperidad del país, y así, se encuentran listos para apoyar toda inversión que tienda a producir una mejora nacional y que se desarrolle dentro de las normas de una sana economía.

Por fuerza de las circunstancias, las compañías petroleras tuvieron que iniciar la marcha hacia la mejoría en las condiciones de vida y en las sanitarias en muchas partes de Venezuela. El petróleo está donde uno lo encuentra, y los sitios en que se halla, no son siempre, o comunmente, modelos de higiene. Se han tallado campamentos en las selvas, en sitios donde el paludismo y otras enfermedades tropicales eran endémicas. La experiencia ha demostrado, notablemente durante la construcción del Canal de Panamá, que no se pueden llevar a cabo con éxito grandes empresas en los trópicos, si no se protege la salud de los trabajores. Hombres palúdicos o que tengan alguna enfermedad que los esté desgastando, no pueden trabajar con eficiencia. Así las compañías petroleras que estaban trabajando en lugares remotos

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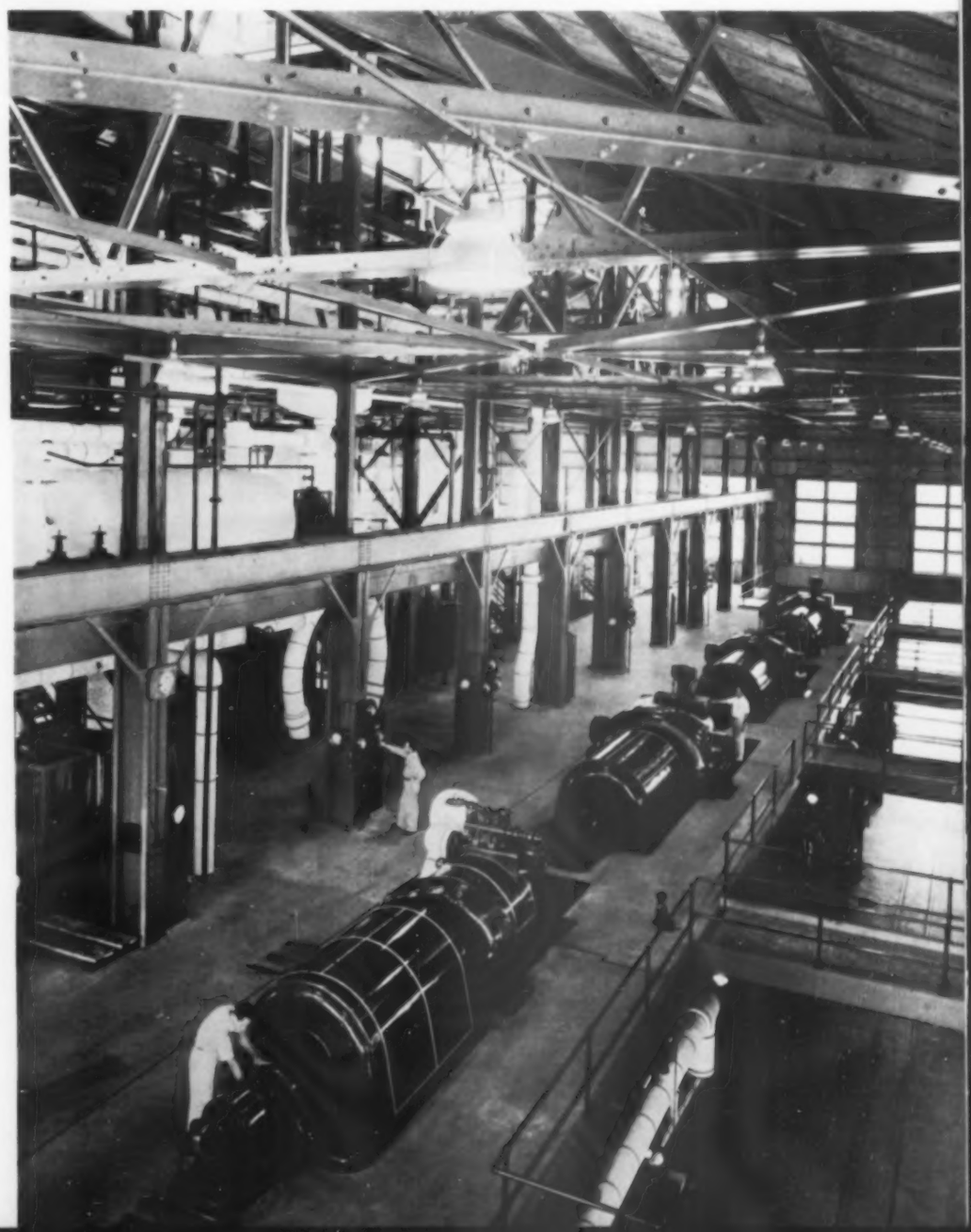

Sr. Henry J. Allen, el conocido editor de Kansas, publicista y estadista está compilando los resultados de sus extensos viajes y observaciones en Venezuela en un libro que será publicado a principios del año entrante por Doubleday Doran & Company.

other uses, and have brought interior regions into touch with markets that they could not reach before. In connection with the building of the pipeline of Mene Grande Oil Company from the Oficina field to tidewater a highway has been constructed that extends all the way from Ciudad Bolivar on the Orinoco to Puerto La Cruz, near Guanta, on the Caribbean. This is one of many similar cases.

The men who drilled the first wells in Venezuela came mostly from the oil fields in Texas and the Mid-Continent of the United States. As time went on however, the companies found among their Venezuelan workers men who had acquired the experience necessary for the exacting tasks of the driller, truck driver and other skilled occupations. Today the great majority of the oil workers are Venezuelans whose aptitude and reliability is warmly praised by operating officials. Many of the men who have received this practical kind of training go back to the towns from which they came and set up repair shops or other businesses of their own providing an increasing group of skilled artisans and spreading new ideas of efficiency and new tastes in living.

The oil companies would be the last to claim that the various activities referred to are expressions of philanthropy on their part. They are undertaken as part of the job and are justified from the viewpoint of the companies themselves by the results obtained. At the same time there can be no question that they have been beneficial to the nation itself and have contributed greatly toward raising the standards of health and living. The experience of the companies in road building, the erection of hospitals and other public works has been drawn upon frequently by the government for construction work that is quite independent of oil operations. The companies have carried on these works as a special service to the government and the companies in return have received special considerations which the government is empowered to grant within the framework of existing laws.

Lest it be inferred that relations between the oil companies and the government are wholly idealistic it may be pointed out that disputes and differences of opinion do occur though these never yet have assumed serious proportions. The policy of the government toward its chief industry while in the main an enlightened one, has been subject to fluctuations that have been reflected in ups and downs for the industry and in an intensification or a slowing down of development activity according to the terms of the legislation in which it was expressed.

The oil industry in Venezuela is still a young industry. In its main operations it is less than twenty-five years old.

So far as foreign capital is concerned, it started out as a clean-cut gamble in a difficult and uncertain field, requiring heavy investment. They are still gambling.

In exploring a new field in eastern Venezuela, one petroleum company spent $30,000,000 before it got a single barrel of oil. A vital thing about the expenditure was that it finally opened a genuine field.

The oil game in Venezuela of necessity has been a big business activity from the beginning. Although Venezuelan oil fields had produced 1,695,875,000 bbl. of oil to the end of 1938, which is a little over five percent of the entire crude produced throughout the world in all time, oil operations there started out in bad luck and discouragement.

A few incidental references, in reports of early explorers, to seepages of petroleum, and occasional allusions by Venezuelans to use of this substance, summarize the history of the industry in Venezuela before the latter part of the 19th century. In the year 1883 the Compania Petroleo del Tachira, a Venezuelan organization, obtained from the State of Tachira a concession on a small tract of land near Rubio, about 25 kilometers from San Cristobal. This concession permitted the owner to prospect for petroleum and allied substances, as well as to refine and sell such products. The supply of oil obtained on this

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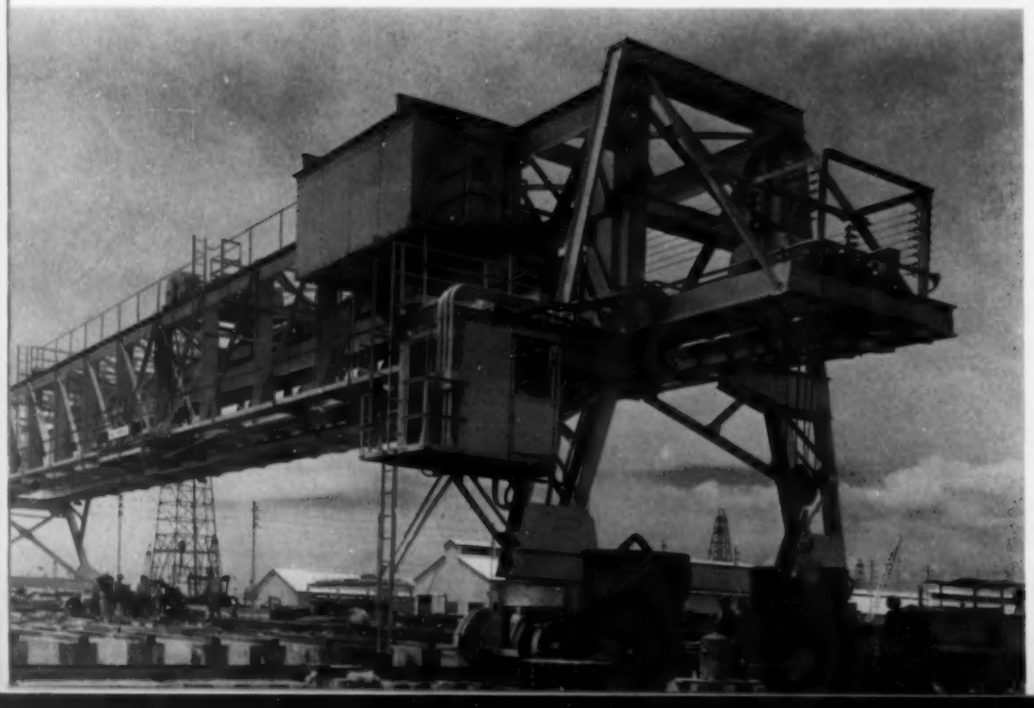
Cement pile casting yard of Lago Petroleum at La Salina: 50 ton crane picks up 133 ft. piles and places them on barge.



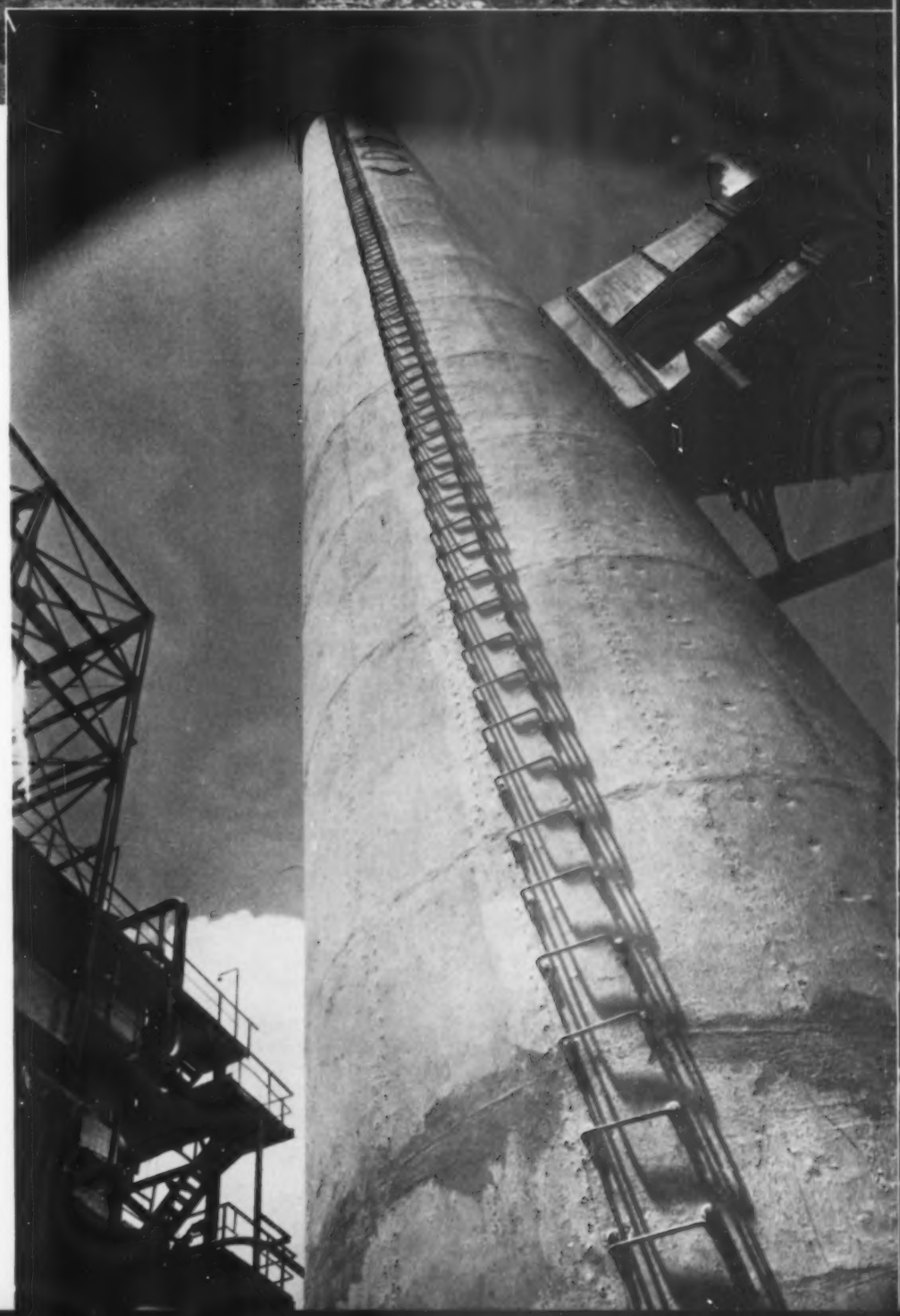
donde se encontraban muchos de sus campamentos, tuvieron que ver la forma de suministrar asistencia médica a sus empleados.

Asimismo, era necesario construir habitaciones para los trabajadores. Muy natural que con la experiencia y con las ideas que habían traído los constructores sobre las comodidades del hogar, esas habitaciones fueran de construcción sólida, y tuvieran conveniencias modernas. A medida que las aldeas crecían, era lógico establecer una escuela, luego un hospital para atender mejor a los enfermos y heridos. Así, por el mismo proceso que ha tenido lugar en miles de comunidades en los Estados Unidos, vinieron a crearse en las ciudades petroleras de Venezuela, facilidades para una vida mejor y educación e higiene más perfectas. Con el activo apoyo del Gobierno, éste movimiento se está extendiendo ahora a todas las regiones del país y a comunidades que no tienen nada que ver con actividades petroleras.

Las compañías de petróleos han contribuido también en otras direcciones, al progreso material de Venezuela. Uno de los tropiezos para el desarrollo del país, era la falta de facilidades de transportes y la escasez de buenos caminos. Las compañías petroleras se vieron obligadas a construir vías para poder llevar a sus terrenos y campamentos los pesados equipos que se necesitan para perforar pozos y transportar el petróleo. Naturalmente, estos caminos quedan disponibles para otros usos y han puesto las regiones interiores del país en contacto con mercados que no podían antes alcanzarse. En conexión con la construcción del oleoducto de la Mene Grande Oil Company, del campo a la costa, se ha construido una carretera que se extiende a través de todo el trayecto entre Ciudad Bolívar, en el Orinoco, y Puerto La Cruz, cerca de Guanta, en el Caribe. Es éste uno de muchos casos semejantes.

Los hombres que perforaron los primeros pozos en Venezuela, vinieron principalmente de los campos petrolíferos de Tejas y del centro de los Estados Unidos. Sin embargo, a medida que fue pasando el tiempo, las compañías empezaron a encontrar entre sus trabajadores venezolanos, hombre que habían adquirido la experiencia necesaria para desempeñar los difíciles oficios de perforadores, conductores de camiones, y otros para los que se requiere destreza. Hoy, la gran mayoría de los trabajadores petroleros son venezolanos cuya aptitud y competencia, son alabadas calurosamente por los operarios dirigentes. Muchos de los que han recibido este entrenamiento práctico, vuelven a las ciudades de donde vinierons y establecen talleres de reparaciones u otros negocios propios, creando así un creciente grupo de artesanos diestros, y diseminando nuevas ideas sobre eficiencia y nuevos gustos para la vida.

Las compañías petroleras serían las últimas en pretender que todas estas actividades son manifestaciones de filantropía de su parte. Tales actividades se han llevado a cabo como parte de un trabajo y quedan justificadas, desde el punto de vista de las compañías mismas, por los resultados obtenidos. Al mismo tiempo, es incuestionable, que ellas



Above, part of Mene Grande Oil's Guanta-Oficina road under construction, and right the towering chimney of the Caripito refinery.

han sido beneficiosas para la nación y que han contribuido considerablemente a levantar los niveles de higiene y de vida. La experiencia de las compañías en construcción de carreteras, hospitales y otros edificios públicos, ha sido usada por el Gobierno para trabajos de construcciones independientes de las operaciones petroleras. Las compañías han llevado a cabo estos trabajos como un servicio especial al Gobierno en cambio de lo cual reciben consideraciones especiales que el Gobierno puede otorgarles de acuerdo con la estructura de las leyes actuales.

Para que no vaya a inferirse que las relaciones entre las compañías petroleras y el gobierno son enteramente idealistas, es conveniente anotar que en ocasiones se presentan disputas y diferencias de opinión, aun cuando nunca han asumido ellas proporciones serias. La política del Gobierno en relación con su industria principal, aun cuando en general ha sido inspirada, ha estado sujeta a fluctuaciones que se reflejan en las altas y bajas de la industria, y en una intensificación o entorpecimiento del desarrollo de sus actividades, de acuerdo con los términos de la legislación en que tal política haya sido expresada.

La industria de petróleos en Venezuela, es todavía una industria joven. Sus principales operaciones datan solamente de 25 años.

En lo tocante a capital extranjero puede decirse que se comenzó como un puro juego en un medio difícil e incierto, que requería una fuerte inversión. Todavía se está jugando.

Una compañía petrolera, en el oriente de Venezuela, gastó $30.000.000 para explorar un nuevo campo, antes de poder sacar un solo barril de petróleo. Un asunto vital sobre este gasto, fue que abrió un verdadero campo cuando por fin se dio con la vena.

El juego del petróleo en Venezuela ha constituido necesariamente una enorme actividad

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concession has been secured from pits or wells dug by hand into the out-cropping oil-bearing formations. This property is still being worked today.

No further interest was shown in petroleum until 1904 when a new mining code was enacted which contained special reference to petroleum and asphalt. The new mining code provided that claims could no longer be taken up by denouncement proceedings, but only under special contract entered into with the Federal Executive. This law was remodeled in 1905 and placed in the hands of the Executive a great deal of power which heretofore he had not possessed. And in 1906 an executive decree outlined the whole procedure under which concession contracts were to be entered into under the 1905 law. Many such concessions contracts were made and four of these are in force today, namely:

1. Colon District (Colon Development Co., Ltd.)
2. The Maracaibo and Bolivar District (Venezuelan Oil Concessions, Ltd.)
3. Buchivacoa District (British Controlled Oilfields, Ltd.)
4. Silver and Zamora District (North Venezuelan Petroleum Co., Ltd.)

One of these early concession-contracts was entered into with General Aranguren, a Venezuelan who had discovered seepages of oil in the Maracaibo District and attempted to develop the obvious fact that oil existed but failed because of the exhaustion of funds. This concession contract formed the basis for the Venezuelan Oil Concessions, Ltd. It spent a great deal of money in the districts of Maracaibo and Bolivar, which were covered by the concession contract. The Royal Dutch Shell, owned largely by British and Dutch capital, came to the relief of the Venezuelan Oil Concessions. It, in turn, was about to abandon the project after the expenditure of large sums of money for test purposes.

In 1908 the General Asphalt Company entered into a concession contract to develop the asphalt field but this has not become an important part of Venezuelan endeavor since asphalt deposits located elsewhere, notably in Trinidad, had better transportation, lower labor costs, and easy opportunity to reach asphalt markets. Moreover the whole subject of crude asphalt has been rendered unimportant by modern petroleum refining, which is producing asphalt as a by-product at a cost less than that at which asphalt might be mined from so-called asphalt lakes. The extensive areas covered by the concession contract of the General Asphalt Company were acquired by the Royal Dutch Shell.

Under the codes of 1909-10, a roving concession contract was entered into with Mr. John Allen Tregelles, an Englishman, to explore the whole Northern part of Venezuela. After drilling a well near Cumana without results, his concession rights lapsed after a period of two years through non-performance.

The Venezuelan oil concession contract until 1912 comprised large areas, usually entire districts and were made on liberal terms. Large areas and liberal terms alone were able to attract necessary capital to explore and exploit because Venezuela had little geological information as a guide for the explorers.

The oil companies themselves had to secure and assemble it. While considerable work has been done in this respect, the available Venezuelan geological information even today is in no way comparable to that of the United States where the United States Geological Surveys, oil company operations over three-quarters of a century and scientific papers and books combine to give those interested complete and accurate background.

This lack of geological information, coupled with the fact that oil was not being produced in modern commercial quantities until 1914, caused Venezuela to continue the program of making contracts covering extensive areas on liberal terms.

The year 1914 was a big one for Venezuela. That year the Caribbean Petroleum Company brought in three producing wells in Mene Grande and one in Perija, state of Zulia. In 1914 Venezuelan Oil Concessions, Ltd., brought in a producing well near Cabimas. And in 1914 the Colon Development Company struck oil near Rio de Oro.

These important discovery wells in 1915 brought about modification of the Mining Codes of 1909-1910, which served to restrict somewhat the rights and privileges provided for an earlier mining code. An immediate result was to slow down and shortly nearly stop completely the leasing of any more areas by the oil companies.

The flow of oil capital from Mexico to Venezuela was checked for the time being while the interested companies investigated the oil possibilities of Colombia.

In the meantime, Venezuela, because of allied petroleum needs plus limited development work by the companies, gave serious consideration to new modification of her mining laws. As a result, the 1918 regulatory decree liberalized the Venezuelan policy. And within two years the search for oil as well as the development of proven areas began and was carried on with increasing efforts and expenditures. This Venezuelan aid and encouragement to the oil companies was perfectly timed in that they were offered during the period when Mexico's efforts were most determined to confiscate foreign-owned oil properties.

As a further inducement to foreign capital Venezuela again modified her petroleum law in 1922 and established a fair working basis. Subsequent modifications in 1925 and in 1928 maintained the same liberal, fair basis but dealt more with detail of operation than with fundamental principles.

Many of the oil companies operating in Venezuela acquired concession contracts covering extensive areas during this period and some of them spent many millions of dollars in unsuccessful exploration work. Although the exploratory work continued, Venezuela made no new leases between 1929 and 1934. The leases made following 1934 were on the basis of higher royalties, initial payments and tax payments than were those previously established. These new rates work equitably in proven areas; they are impracmercantil desde el principio. Aun cuando los campos petroleros venezolanos han producido 1.695.675.000 barriles de petróleo hasta fines de 1938, lo cual es un poco más del 5% de todo el crudo del mundo, en todo tiempo, las operaciones petroleras comenzaron allá con mala suerte y desalientos.

La historia de la industria petrolera en Venezuela, antes de la última parte del siglo XIX puede resumirse en unas cuantas referencias incidentales sobre filtraciones de petróleo que aparecieron en los informes de los primeros exploradores y alusiones, ocasionales hechas por los venezolanos sobre el uso de esa substancia. En el año de 1883, la Compañía de Petróleo del Táchira, una organización venezolana, obtuvo del Estado del Táchira, una concesión por una pequeña extensión de terreno cerca a Rubio, alrededor de 25 kilómetros de San Cristóbal. Esta concesión permitía a su dueño hacer exploraciones en busca de petróleo y substancias aliadas, y refinar y vender esos productos. La cantidad de petróleo obtenida bajo esta concesión, fue sacada de hoyos o pozos cavados a mano en las brotaciones petrolíferas. Todavía se está trabajando esa propiedad.

No se notó ningún otro interés por el petróleo hasta 1904 cuando se promulgó un nuevo código minero el cual contenía referencias especiales al petróleo y al asfalto. El nuevo código estipulaba que no se podían establecer titulos en lo sucesivo por medio de denuncios, sino que era necesario hacer un contrato especial, con el Ejecutivo Federal. Esta ley se reformó en 1905, poniendo entonces en manos del Ejecutivo un poder que no había tenido hasta entonces. Y en 1906, por medio de un decreto ejecutivo, se fijó todo el proceso que era necesario seguir para obtener contratos de concesión bajo la ley de 1905. Se hicieron muchos de esos contratos de concesión y cuatro de ellos están hoy en vigencia, a saber:

1. **Distrito de Colon. (Colon Development Co., Ltd.)**
2. **Distrito de Maracaibo y Bolívar. (Venezuelan Oil Concessions, Ltd.)**
3. **Distrito de Buchivacoa (British Controlled Oilfields, Ltd.)**
4. **Distrito de Silver y Zamora (North Venezuelan Petroleum Co., Ltd.)**

Uno de estos primeros contratos de concesiones fue celebrado con el General Aranguren, un venezolano que había descubierto filtraciones de petróleo en el distrito de Maracaibo, y pretendió desarrollar el hecho obvio de que el petróleo existía, pero fracasó por habérsele acabado los fondos. Este contrato de concesión fue la base de la Venezuelan Oil Concessions Ltd., Ella gastó una gran cantidad de dinero en los distritos de Maracaibo y Bolívar que estaban amparados por el contrato de concesión. La Royal Dutch Shell, de capital inglés y holandés, en su mayor parte, vino al rescate de la Venezuelan Oil Concessions y estuvo a su vez por abandonar el proyecto después de haber gastado grandes sumas de dinero en ensayos.

En 1908, la General Asphalt Company, negoció un contrato de concesión para desarrollar el campo de asfaltos, pero este ramo no ha llegado a formar parte importante del esfuerzo venezolano, pues algunos

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depósitos de ese producto, situados en otras partes, especialmente en Trinidad, tenian mejores transportes, costos de producción más baratos y fácil acceso a los mercados de asfalto. Además, la cuestión del asfalto crudo ha llegado a carecer de importancia debido a la moderna refinación del petróleo que permite producir asfalto como producto derivado o accesorio a un costo más bajo de lo que se pudiera obtener sacándolo de los llamados lagos de asfalto. Las extensas áreas que abarca el contrato de concesión de la General Asphalt Company fueron adquiridas por el grupo de la Royal Dutch Shell.

Bajo los códigos de 1909-10, se negoció un contrato de concesión errante con el señor John Allen Trejellos, Inglés, para explorar toda la parte septentrional de Venezuela. Después de perforar un pozo cerca de Cumaná, sin resultados, sus derechos de concesión expiraron después de dos años por falta de operaciones.

El contrato de concesión de la Venezuelan Oil, comprendia extensas áreas hasta 1912, usualmente distritos enteros, y habia sido otorgado en términos liberales. Solamente grandes terrenos y términos liberales podian atraer el capital necesario para la exploración y explotación, pues Venezuela tenia muy poca información geológica para guiar a los exploradores.

Las compañias de petróleos, tenian que conseguir y arreglar esos datos. A pesar de que se han hecho trabajos considerables en este sentido, la información geológica venezolana disponible, aun hoy dia, no puede comparar-se con la de los Estados Unidos, en donde las investigaciones oficiales, las operaciones de las compañias petroleras durante más de las treas cuartas partes de un siglo, y los documentos y libros cientificos

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Left, M.G.O.C. pipeline terminal at Puerto La Cruz, and below, labor camp at Carapitio.

tical in undeveloped areas and therefore have slowed down exploratory work in undeveloped portions of Venezuela.

Interestingly enough, these new restrictive laws in Venezuela have slowed down exploratory work there just as restrictive laws had done earlier in Mexico. And just as Venezuela's earlier liberal laws had encouraged oil capital to go there from Mexico so today Colombia, through liberalized laws, is encouraging oil capital to undertake exploratory work, which it is doing.

In the meantime the peak of Venezuelan oil production is kept high by its momentum, just as it did in Mexico, where, although restrictive efforts began in 1917, the high peak of production was not reached until 1921. During this four-year period capital was busily searching for new areas in other countries and preparing to migrate to countries where conditions were more favorable.

No one today can foresee the outcome of Venezuela's restrictive program. If continued, exploratory work will be halted in time and production will drop. If the recently initiated exploratory activity in Colombia is successful the oil produced there will compete with Venezuelan oil in world markets and thus affect its available outlet and its price.

Whatever the ultimate result international oil companies today have large Venezuelan holdings.

Areas Held by Operating Companies

	Eastern Venezuela	Western Venezuela	Total Acres
Standard Oil Co. of Venezuela	3,766,290	1,176,850	4,943,140
Lago Petroleum Corp.	685,646	937,182	1,622,827
Meme Grande Co.(Gulf)	2,598,299	111,871	2,710,170
Dutch Shell Group	287,590	4,191,924	4,479,514
Socony-Vacuum	1,502,407	.....	1,502,407

Acreage Held by Other Companies

	Net Acres
Consolidated Oil (Sinclair Interests)	726,141
Venezuela Atlantic Refining Co.	128,823
Texas Co. of Venezuela	343,685
Alfred Meyer Interests	1,639,612
Pantepec Group	575,000
Standard Oil Co. of California	125,833
Coro Petroleum Co.	58,569
British Controlled Oilfields, Ltd.	859,923
North Venezuela Petroleum Co., Ltd.	1,413,437
Venezuelan Seaboard Oil Co.	49,475
American Maracaibo Oilfields	27,015

Only a small percentage of the oil companies actively operating in Venezuela have been successful in developing commercial production. The Beacon Sun Oil Company was very active in Venezuela from 1922-1930, during which time it held up to 1,750,000 acres under concession contract and drilled ten wildcat wells, all without success.

The Richmond Petroleum Company of Venezuela, subsidiary of the Standard Oil Company of California, has been active in search for Venezuelan reserves since 1924. Although it has spent large sums in this endeavor, it failed to encounter substantial quantities of oil.

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Above, turret lathe in Lago's very complete marine machine shop, and left, M. G. O. C's club house at Maracaibo.

Henry J. Allen, the author.

publicados, se combinan para dar a los interesados una pintura completa y exacta.

Esta falta de información geológica, unida al hecho de que el petróleo no se produjo en cantidades comerciales modernas sino hasta 1914, hizo que Venezuela continuara el programa de hacer contratos por regiones muy extensas, en condiciones liberales.

Mil novecientos catorce fue un gran año para Venezuela. En ese año, la Caribbean Petroleum Company, se presentó con tres pozos en producción en Mene Grande y uno en Perija, Estado del Zulia. En 1914, la Venezuelan Oil Concessions Ltd., trajo a producción un pozo cerca a Cabimas. Y en el mismo año, la Colon Development Company, encontró petróleo cerca de Rio de Oro.

El descubrimiento de estos importantes pozos en 1915 produjo la modificación de los códigos mineros de 1909-1910, la que sirvió para restringir un tanto los derechos y privilegios establecidos por los otros códigos. Uno de los resultados inmediatos fue el de entorpecer y poco después, casi suspender completamente los contratos de arrendamientos de más terrenos por las compañías petroleras.

El movimiento de capital petrolero de Méjico a Venezuela, quedó reprimido por el momento mientras que las compañías interesadas investigaban las posibilidades petroleras de Colombia. Entretanto, Venezuela, debido a las necesidades aliadas del petróleo y al limitado trabajo de desarrollo llevado a cabo por las compañías, dio seria consideración a una nueva modificación de sus leyes mineras, con el resultado de que el decreto regulatorio de 1918, liberalizó la política venezolana. Y en el curso de dos años, comenzaron las actividades para buscar petróleo y para desarrollar las áreas ya probadas, llevándose a cabo esas actividades, con un aumento de esfuerzos y de gastos. Esta ayuda venezolana y su aliento a las compañías de petróleo, fueron muy oportunos, ya que se ofrecieron en los momentos en que los esfuerzos de Méjico se estaban concentrando con más determinación en la confiscación de propiedades petroleras de capital extranjero.

Como otro aliciente para el capital extranjero, Venezuela modificó de nuevo su ley de petróleos en 1922, y estableció justas bases para los trabajos. Las modificaciones subsiguientes que se hicieron en 1925 y en 1928, mantuvieron las mismas bases liberales y justas, pero dieron más importancia a los detalles de la operación que a los principios fundamentales.

Muchas de las compañías petroleras que operaban en Venezuela, adquirieron contratos de concesiones por extensas áreas en ese período y algunas de ellas gastaron muchos millones de dólares en trabajos de exploración infructuosos. Aun cuando los trabajos de exploración continuaron. Venezuela no hizo nuevos contratos de arrendamiento entre 1929 y 1934. Los contratos hechos a partir de 1934, se hicieron sobre la base de regalías, pagos inciales y pagos de impuestos más altos que los establecidos anteriormente. Estas nuevas tasas resultan equitativas en áreas ya probadas, pero no son prácticas en terrenos no desarrollados, y por lo tanto, han entorpecido los trabajos de exploración en algunas porciones no desarrolladas de Venezuela.

Es interesante anotar que estas nuevas leyes restrictivas en Venezuela, han entorpecido los trabajos de exploración, lo mismo que tales leyes restrictivas hicieron en Méjico. Y así como las primeras leyes liberales de Venezuela animaron al capital extranjero a ir de Méjico allá, Colombia hoy, por medio de legislación liberalizada, está alentando el capital de petróleos a comenzar trabajos de exploración, los cuales se están llevando a cabo.

Entretanto, la cima de la producción petrolera venezolana se mantiene alta por su mismo impulso, como sucedió en Méjico, donde a pesar de que los esfuerzos restrictivos comenzaron en 1917, el máximo de producción no se alcanzó sino hasta 1921. Durante ese período de cuatro años, el capital estaba ocupado en buscar activamente nuevas áreas en otras naciones, preparándose para emigrar a países donde las condiciones fueran más favorables.

Nadie puede preveer hoy cual será el resultado del programa restrictivo de Venezuela. Si ese programa se prolonga, el tra-

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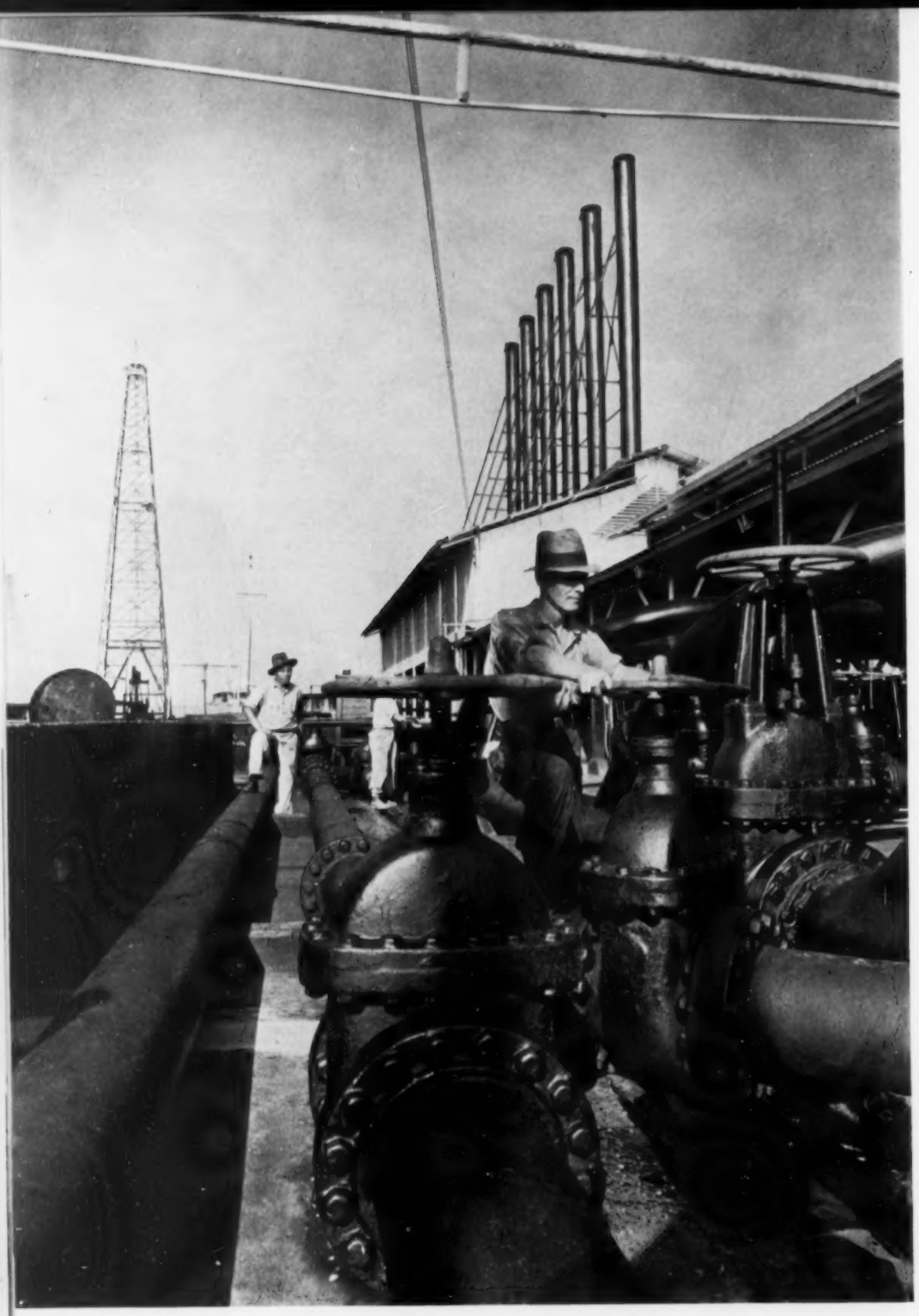
Mixing the cement at La Salina for drilling rig foundations as much as seven miles off-shore.



Loading line manifold at the base of Mene Grande Oil Company's shipping pier at Lagunillas.

In its beginning days in Venezuela, the Standard Oil Company of New Jersey spent $20,000,000 drilling wells in what looked like favorable territory in Western Venezuela without striking a commercial field. Engineers and geologists were working everywhere in the Maracaibo fields, which then held the center of attention and expectation so far as oil was concerned in Venezuela.

During the early exploration period, if the companies wished to hold the land for exploitation, they must make thorough survey. The boundaries must be traversed with chain and transit, permanent corner posts set with suitable reference ties, all rivers, roads and state and district boundaries falling within their limits or within a kilometer outside the limits were also to be traversed.

This survey having been made, the total area of the concession contract must then be divided into halves, one half of the surveyed area becomes the final area available for oil exploitation by the purchaser.

The other half of the area reverts to the nation as national reserves.

At the end of the three year exploration period, the lessors are required to present to the Minister of Fomento for approval a large scale map of the whole area made according to strict specifications, showing all details of survey and individual maps of each 500-hectare parcel, together with copies of all survey notes and calculation sheets.

These are checked by the technical staff of the Department of Fomento before approval by the Minister, and a tax collected for each map. These maps, which have been prepared by the oil explorers, are retained by the department. However, for a small fee, the oil companies can secure copies of these maps.

Under the concession contract now consisting of half the original area surveyed by the purchaser, the lessor has the exclusive right to explore and exploit the area for a forty-year period.

An annual tax per hectare collected on a graduating scale, beginning at two bolivares and arriving at five bolivares, and in some cases at eight bolivares is charged for the exploitation period.

On oil production, a royalty is collected, either in oil or its value in cash at current world prices at the nation's discretion, the production figures being checked at the wells by Venezuelan officials of technical training.

It has been regarded as a good law for the nation. There are no loop-holes in it, and in all my questioning in Venezuela, I have never heard a criticism touching the dealing between the oil companies and the government.

The provisions of the government for dividing every concession after the oil company had gone to the expense of exploring and mapping the concession, have been thought by some to be a little too clever to be entirely equitable.

Under this reservation, the government holds half of the survey made by the geologists, geophysicists, and technical men of the oil company as its reserve property. If the petroleum company strikes oil, immediately the adjoining reserve property held by the government bounds up in price. In a number of instances the government has sold this proven territory to the oil company in order that the production might all be in one concession. When such sales have been made, they have yielded the government highly substantial returns, upon scientific exploration by the oil companies which has cost the government nothing.

If the oil companies had turned a deal like this upon the government, I feel sure we would have heard some severe words in criticism of the predatory methods of foreign capital.

The state of the oil industry in Venezuela does not seem to be challenged by any threat of confiscation, such as has ruined the oil situation in Mexico, surrendered to communism, and in Bolivia, surrendered to the plainer type of common theft.

The Venezuelan oil industry has never been disturbed by the several changes in the oil law during the past years. However, the new

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bajo exploratorio se entorpecerá, y a su tiempo, caerá la producción. Si la actividad de las exploraciones que se han iniciado recientemente en Colombia tiene éxito, el petróleo producido allá competirá con el de Venezuela en los mercados mundiales y afectará entonces sus salidas disponibles y sus precios.

Sea cual fuere el resultado final, las compañías petroleras internacionales tienen hoy grandes propiedades en Venezuela.

Areas Retenidas por Compañías Operadoras

	Venezuela Oriental	Venezuela Occidental	Total de Acres
Standard Oil Company of Venezuela	3,766,290	1,176,850	4,943,140
Lago Petroleum Corporation	685,645	937,182	1,622,827
Mene Grande Co. (Gulf)	2,398,299	111,871	2,710,170
Grupo Dutch Shell	287,590	4,191,924	4,479,514
Socony-Vacuum	1,502,407	——	1,502,407

Propiedades de otras compañías:—

	Acres Netos
Consolidated Oil (Intereses Sinclair)	726,141
Venezuela Atlantic Refining Co.	128,823
Texas Company of Venezuela	343,685
Alfred Meyer Interests	1,639,612
Grupo Pantepec	575,000
Standard Oil Co. of California	125,833
Coro Petroleum Co.	38,569
British Controlled Oilfields, Ltd.	859,923
North Venezuela Petroleum Co., Ltd.	1,413,437
Venezuelan Seaboard Oil Co., Ltd.	49,475
American Maracaibo Oilfields	27,015

Unicamente un pequeño porcentage de las compañías petroleras que activamente operan en Venezuela, ha tenido éxito en desarrollar una producción comercial. La Beacon Sun Oil Company, muy activa en Venezuela de 1922 a 1930, con propiedades hasta 1.750.000 acres, en contrato de concesión, perforó 10 pozos de petróleo, todos sin éxito.

La Richmond Petroleum Company de Venezuela, subsidiaria de la Standard Oil Company de California, ha sido muy activa en sus pesquisas por reservas venezolanas desde 1924, y aun cuando ha gastado grandes sumas en estos esfuerzos, no ha podido encontrar cantidades substanciales de petróleo.

En sus comienzos en Venezuela, la Standard Oil Company de New Jersey gastó $20.000.000 perforando pozos en lo que parecía territorio favorable en la parte occidental de Venezuela, sin dar con un campo comercial. Los ingenieros y geólogos estuvieron trabajando activamente en todos los campos de Maracaibo, que eran entonces, en lo que se refiere al petróleo venezolano, el centro de atracción y de esperanzas.

Durante la época del primer período de exploración, si las compañías deseaban retener la tierra para explotación, tenían que hacer una inspección completa. Había que atravesar las fronteras con cadena y tránsito, fijar postes de esquina permanentes, con indicaciones de referencia adecuadas, y todos los rios, caminos y límites de estado y de distrito que cayeran dentro de sus límites o quedaran a un kilómetro fuera de ellos, tenían también que atravesarse.

Una vez que se había hecho esta inspección, el área total del contrato de concesión tenía que dividirse entonces en mitades, y una mitad del área ya inspeccionada venía a ser el área final disponible para la explotación petrolera por parte del comprador.

La otra mitad del área volvía a poder de la nación como reserva nacional.

Al final del período de explotación de tres años, los arrendatarios tenían que presentar

The only church in the recently destroyed village of Lagunillas, built on stilts over the lake.

al Ministro de Fomento, para su aprobación, un mapa grande, con escalas, de toda el área, preparado de acuerdo con extrictas especificaciones, y conteniendo todos los detalles de las inspecciones, y mapas individuales de cada parcela de 500 hectáreas, junto con copias de todas las notas de inspección y de las hojas de cálculos.

Todo esto era chequeado por el personal técnico del Departamento de Fomento antes de su aprobación por el Ministro, y se cobraba un impuesto por cada mapa. Estos mapas, que habían sido preparados por los exploradores petroleros, eran retenidos por el departamento. Sinembargo, las compañías de petróleos, podían obtener copias de los mapas por una pequeña suma.

Dentro de los términos del contrato de concesión que consistía ahora de la mitad del área original estudiada por el comprador, el arrendatario tenía el derecho exclusivo de explorar y explotar el terreno por un período de 40 años. (Pasa a la pagina 61)

Legislation adopted in 1938 contains some provisions so onerous that it is doubtful if any foreign company would now make application for a concession contract under it.

Lawyers both of the government and of the oil companies contend that the law contains unconstitutional provisions.

Some hint of intention on the part of the government of Venezuela to go into the oil business itself, to exploit, refine and transport its own oil is contained in Article Two of the new law, which provides that the government itself may exercise the right to develop, refine and transfer petroleum, and that it may form government companies through which to do this.

There is no doubt, of course, that great tracks of land providing oil possibilities have not been explored. In addition, Venezuela still owns proven territory under the regulation by which she reserved one-half of the oil concessions.

The concession contracts that have been entered into heretofore, and cannot be abrogated by new laws, run for forty years. This means that the first ones still have something like twenty years to run, while many of them have practically the full period before them, since prior to the 1938 oil law additional concession contracts have been entered into continuously as the explorations have grown.

Many millions of dollars have been invested upon areas which have yielded nothing. The revelation of the capital expenditure of the oil companies in Venezuela each year would be staggering. For the year 1939 it is estimated that the capital investment of the oil companies in Venezuela will be $50,000,000. This is outside of money spent on royalties, wages, or current expenses. It is for the permanent improvement and equipment of the fields.

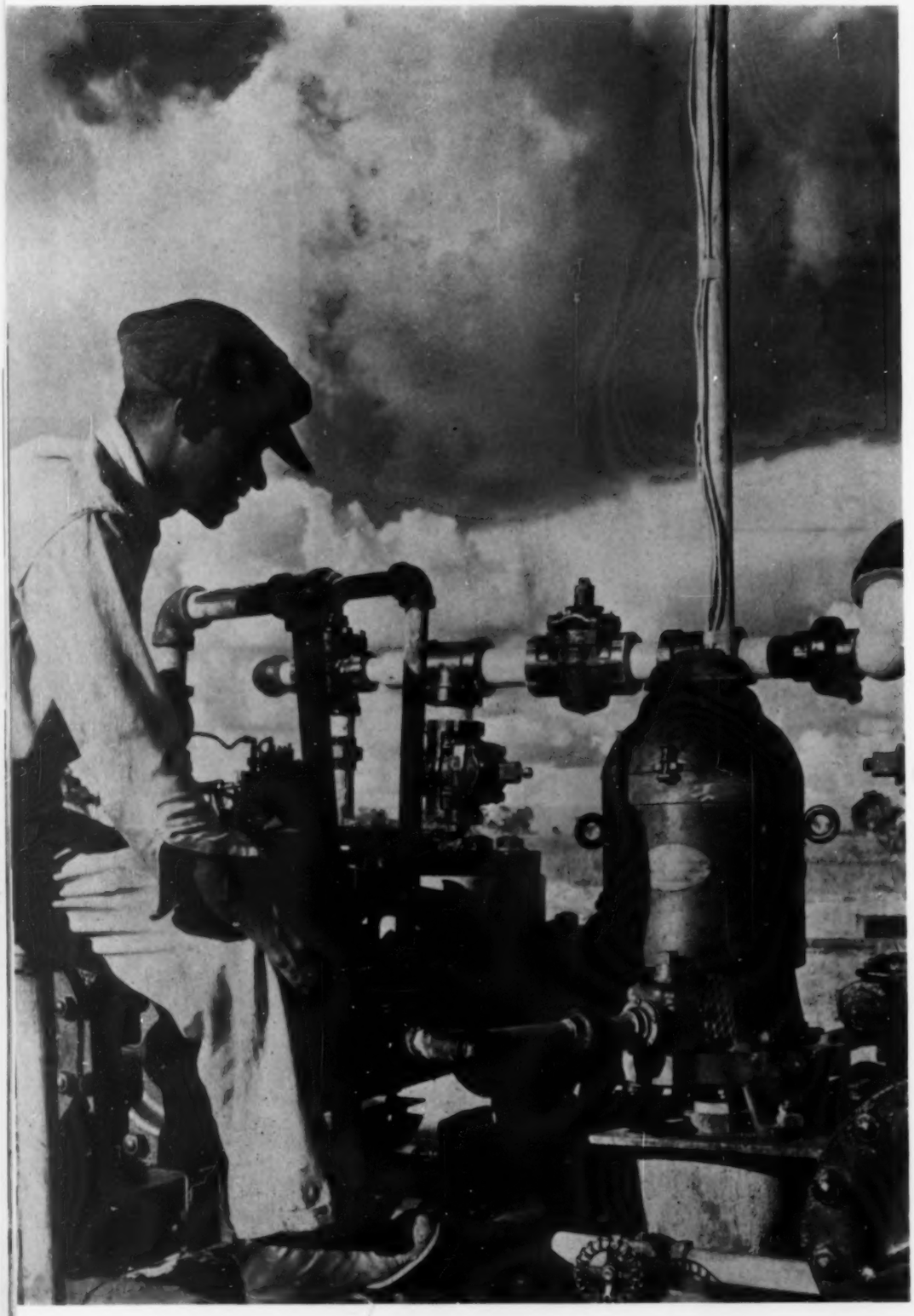
One of the provisions of the new law in Article 13 would authorize the government to undertake exploitation in prohibitive zones located within the area governed by the concession contract and apparently would open the door for the government to develop these prohibitive areas to the exclusion of the right of the concessionaire.

One studies the oil situation in Venezuela with a sense of comfort in the existing status between the government and the producers.

When, twenty years ago, the oil industry began its effective role in this, the most productive country in South America, and the third most productive in all the world, it was not embarrassed by any past history. They began upon a basis of mutual interest protected by fair and honest administration by both parties. Both the companies and the government have prospered out of the vast operation.

The present social program of the new government merges with the social program which the oil companies, with their western grasp of scientific sanitation and education, began to build in the early days of their battle against tropical dangers and difficulties.

There ought to remain fifty years of potential production in the Venezuela field. With the community interest which now exists between the government and the great producing companies, the common prosperity should extend, not only to the people of Venezuela, but to the building of new industries and the development of new resources in the rich natural state of Venezuela, which will take the place of the oil resources as they decline.



Left, vertical turbo generator in Mene Grande's Oficina field, and opposite camp for employees of Lago Petroleum Corp. at Lagunillas, marked contrast to the village over the lake.

Se cobraba por el período de explotación un impuesto anual por hectárea, en una escala graduada que comenzaba por dos bolívares y llegaba a cinco y hasta a ocho bolívares.

Se cobraba una regalía sobre la producción del petróleo, en petróleo o en su valor efectivo a los precios corrientes del mercado, a discreción de la nación, y las cifras de producción se chequeaban en los pozos por oficiales venezolanos que tenían entrenamiento técnico.

Esto se consideraba una buena ley para la nación. No hay escapes en ella, y en todas mis preguntas e investigaciones en Venezuela, no oí nunca ninguna crítica que tocara las negociaciones entre las compañías petroleras y el gobierno.

Las disposiciones del gobierno sobre la división de toda concesión después de que la compañía petrolera había entrado en el gasto de explorar la concesión y hacer mapas de ella, son consideradas por algunos como un poquito demasiado inteligentes para ser completamente equitativas.

Dentro de esta salvedad, el Gobierno retiene la mitad de los estudios hechos por los géologos, geofisistas, y técnicos de la compañía petrolera, como su propiedad de reserva. Si la compañía de petróleo lo encuentra, inmediatamente la propiedad de reserva adjunta, que pertenece al Gobierno, sube de precio. En un número de casos, el Gobierno ha vendido este territorio probado a la compañía petrolera para que la producción pueda quedar toda en una concesión. Cuando se han efectuado tales ventas, han producido ellas al Gobierno cantidades de consideración, por exploraciones científicas de las compañías de petróleo, que no le han costado nada al Estado.

Si las compañías petroleras se hubieran presentado con una propuesta como ésta al Gobierno, estoy seguro que habríamos oido severas palabras de crítica por los métodos predatorios del capital extranjero.

El estado de la industria petrolera en Venezuela no parece estar bajo ninguna amenaza de confiscación, como el que ha arruinado la situación de los petróleos en Méjico, entregada al comunismo, y en Bolivia, entregada al tipo más simple de robo común.

La industria de petróleos en Venezuela no ha estado nunca perturbada por los muchos cambios hechos en la ley petrolera en los años pasados. Sin embargo, la nueva legislación adoptada en 1938, contiene algunas condiciones tan onerosas que es dudoso que una compañía extranjera haga alguna solicitud para un contrato de concesión en esas circunstancias.

Los abogados del Gobierno y los de las compañías petroleras, afirman que la ley contiene cláusulas inconstitucionales.

El Artículo segundo de la nueva ley, que estipula que el gobierno mismo puede ejercer el derecho de desarrollar, refinar y transportar petróleo, y que puede formar compañías oficiales para llevarlo a cabo, contiene alguna indicación de que el gobierno de Venezuela pueda llegar a entrar en el negocio de petróleo por su cuenta para refinarlo, explotarlo y transportarlo.

No hay duda, por supuesto, de que no han sido exploradas grandes extensiones de terrenos que tienen posibilidades petroleras. Además Venezuela todavía es dueña de territorios ya probados, de acuerdo con la disposición por medio de la cual se reservó una mitad de las concesiones de petróleo.

Los contratos de concesión que se han negociado hasta ahora, y que no pueden ser abrogados por nuevas leyes, duran 40 años. Esto significa que los primeros tienen todavía 20 años para operar, mientras que muchos tienen todavía el período completo delante de ellos, ya que antes de la ley de petróleos de 1938, se habían estado negociando continuamente contractos de concesión, a medida que crecían las exploraciones.

Se han invertido muchos millones de dólares en áreas que no han producido nada sería sorprendente la revelación de los capitales invertidos por las compañías petroleras en Venezuela cada año. Se calcula que en el año de 1939, tales compañías invirtieron $50.-000.000 en Venezuela. Esto es fuera del dinero gastado en regalías, jornales o gastos generales. Es solamente para la mejora permanente y para el equipo de los campos.

Una de las cláusulas de la nueva ley, en el Artículo 13, autoriza al gobierno para llevar a cabo explotaciones en zonas prohibitivas situadas dentro del área gobernada por el contrato de concesión, y aparentemente ésto abriría la puerta al Gobierno para desarrollar esas áreas prohibitivas, con exclusión de los derechos del concesionario.

Uno estudia la situación petrolera en Venezuela con un sentimiento de tranquilidad en la situación que existe entre el gobierno y los productores.

Cuando hace veinte años, la industria petrolera comenzó a jugar su papel principal en este país, el más productivo en Sur América, y el tercero en todo el mundo, no se sintió embarazada con pasadas historias. Se comenzó sobre una base de mutuo interés protegida por una administración justa y honrada de las dos partes. El gobierno y las compañías han recibido beneficios con las vastas exploraciones que se han hecho.

El actual programa social del nuevo gobierno, se funde con el programa social que las compañías de petróleos, con su comprensión occidental de higiene y educación, comenzaron a edificar en los primeros días de su batalla contra las dificultades y los riesgos del trópico.

Deben quedar cincuenta años de producción potencial en el campo venezolano. Con el interés de la comunidad que ahora existe entre el gobierno y las grandes compañías productoras, la prosperidad común deberá extenderse, no solo al pueblo de Venezuela, sino también a la construcción de nuevas industrias y al desarrollo de nuevas fuentes de riquezas naturales en Venezuela, que lleguen a tomar el lugar de las del petróleo, cuando éstas declinen.

OIL CONTRIBUTES to Higher Standard of Venezuelan Living

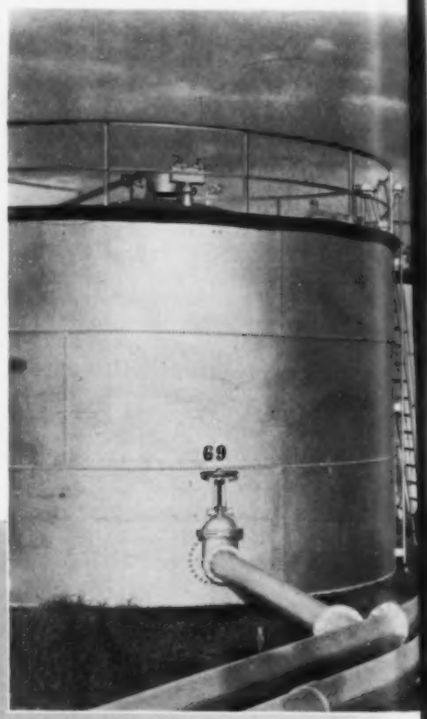
Oil Companies Activities Include Substantial Expenditures for Housing, Sanitation and Education as Well as Roads and Public Works, all Designed to Develop Healthy Capable Workers and a Stable Progressive Country. Investments in Social Welfare Motivated by Desire for Rational Long-Term Development.

ON NOVEMBER 14 in a shack over Lake Maracaibo, a woman resident of Lagunillas, one of the most unusual towns in the world, attempted to light a gasoline lantern. Her inept efforts led to a slight explosion and the lamp burst into flames. Without thinking of the consequences, the terror-stricken woman flung the flaming lantern through the door onto the wooden walkway that connected the village-on-stilts with the shore. In a remarkably short time the wooden streets and tinder dry shacks were blazing and the flames rushed outward in a strong off-shore wind threatening the rest of the village. Men and women fled to the pier at the extreme lakeward end of the village. Oil company launches up and down the lake were manned and hurried to the spot taking off the inhabitants, many of whom had leapt into the lake.

That night radios blared the news across North America and the next morning the general public in New York was startled by headlines screaming of "800 Dead in Venezuelan Oil Town", "Inch-thick Oil Film on Lake Feeds Flames", "Rescue Launch Burned: All on Board Lost."

To one who had just returned from trudging over the filthy walk-ways of Lagunillas, who had visited the modern, sanitary labor camps built and maintained by the oil companies operating in Lagunillas field and who had visited the lovely, sad town of Ojeda, the reports sounded fantastic and more than a little hysterical. One could understand such blatant errors emanating from radio stations where little effort was made to check and confirm the facts; but New York newspapers with their tradition of accuracy and restraint!

Two points, widely referred to in the dispatches give a clue to the extent to which news stories and radio broadcasts were in error and indicate also how little effort was made to check the facts before publication. So far as is known not a single oil worker lived in the town of Lagunillas. It was, in fact, one of those parasitic growths that lived on the earnings of the workers but which was no more a home for oil laborers than a bar, brothel or gambling hall is the home of industrial workers anywhere. Oil workers did visit the town of an evening, but as soon as they had been relieved of their cash by the



Work on the great dyke that holds the waters of Lake Maracaibo back from the world's greatest oilfield at Lagunillas where the land is 10 ft. below the surface of the Lake.

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Peninsula de Paraguana
Pueblo Nuevo
Moruy
Las Piedras
CORO
La Vela
Acurigua
Cabure
San Luis
La Cruz
Pedregal
Capatarida
Casigua
Quisiro
Sinamaica
Paraguaipoa
Carrasquero
San Rafael
Incharte
Rio Macha
Rio Ranchería
Rio Guasare
Rio Socuy
Rio Palmar
LA PAZ
CONCEPCION
MARACAIBO
TOTUMO
Palmarito
Concepcion
Rosario
Machiques
Playitas
El Guaco
ALTAGRACIA
PUNTA LOIVA
LA RITA
MIRANDA
LAS PALMAS
Montero
HOMBRE PINTADO
MEDIA
EL MENE
Guajiro
QUIROZ
MENE GRANDE
F A L C O N
Churuguara
Baragua
Siquisique
Aguada Grande
San Cristobal
Parapara
Bucarita
Matatere
Bobare
Duaca
Rio Tocuyo
Carora
BARQUISIMETO
Cabudare
Cubarigua
Quibor
L A R A
El Tocuyo
Carache
Humocaro Alta
Guarico
Sarare
Araure
Z U L I A
LAKE MARACAIBO
C O L O M B I A
RIO DE ORO
Rosario
Rio Catatumbo
Encontrados
San Carlos
Sta Barbara
LOS MANUELES
Palmira
Las Cruces
Tres Bocas
PETROLEA
Boca Grita
Oropa
La Fria
Sardinata
Colon
El Cobre
Lobatera
Cucuta
San Antonio
Tariba
SAN CRISTOBAL
Rubio
Cordozo
Pregonero
T A C H I R A
La Grita
Bailadores
Tovar
Guaraque
Estangues
Sta Cruz
Lagunillas
Ejido
MERIDA
Mucuchies
M E R I D A
El Vigia
Sabana de Mendoza
Betijoque
Valera
Escuque
TRUJILLO
T R U J I L L O
Bocono
La Quebrada
Torondoy
Timotes
Biscucuy
Ospino
Guanare
P O R T U G U E S
Papelon
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Obispos
Sta. Rosa
Libertad
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Sta Barbara
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Rio Caparo
Rio Guaritico
Rio Catcarita
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El Amparo
La Trinidad
Rio Arichuna
Pamplona
Rio Nula
Rio Sarare
Rio Zulia
to Bogota

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PAN AIR
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Pirito
San Juan
Jacura
Guadima
Tocuyo
Tucacas
Rio Tocuyo
Rio Aroa
Rio Yaracuy
Aroa
YARACUY
SAN FELIPE
Duaca
Aneal
Urachiche
Chivacoa
Yaritagua
Cabudare
Montalban
Bejuma
Nirgua
Pto Cabello
Turiamo
Cumare
Choroni
MARACAY
Turmero
El Victoria
VALENCIA
Tocuyito
CARABOBO
Tinaquillo
DTO FEDERAL
CARACAS
La Guaira
Petare
Guatire
Guarenas
Tacarigua
Carenero
Higuerote
LOS TEQUES
Sta Lucia
Caucagua
Rio Chico
San José
MIRANDA
Ocumare del Tuy
Panaquire
Guapo
Boca Uchire
Villa de Cura
San Casimiro
San Sebastian
SAN JUAN
LOS MORROS
ARAGUA
Camatagua
Altagracia de Orituco
San Francisco de Macaira
San José de Guaribe
Guanape
Valle Guanape
Clarines
Pirito
San Miguel
San Francisco
San Lorenzo
Sarare
SAN CARLOS
Tinaco
El Pao
Agua Blanca
Cojedes
Araure
ACARIGUA
Pirital
Villa Bruzual
Lagunitas
COJEDES
Parapara
Ortiz
San Francisco de Tiznados
San José de Tiznados
Barbacoas
El Sombrero
Lezama
Libertad
Onoto
Aragua de Barcelona
Chaguaramas
Tucupido
Zaraza
Valle de la Pascua
Las Mercedes
El Chaparro
El Rastro
Guardatinajas
CALABOZO
El Baul
Cinero
Florida
Rio Portuguesa
Papelon
Caño Igues
Guanarito
Palenque
GUARICO
El Socorro
Sta Maria de Ipire
Rio Ipire
Espino
El Machete
Suata
San Diego
Guadarrama
Arismendi
Rio Guanare
La Union
Camaguan
Nutrias
Bruzual
Caño Guanaparo
Caño Amarillo
Caño Ruende
Apurito
SAN FERNANDO
Guayabal
Cazorla
AERO POSTALE
El Chimire
Cachicamo
El Trujillo
Parmana
Las Bonitas
Mapire
Cabruta
Caicara
Cuchiveros
Rio Apure
Rio Payara
Achaguas
Guasimal
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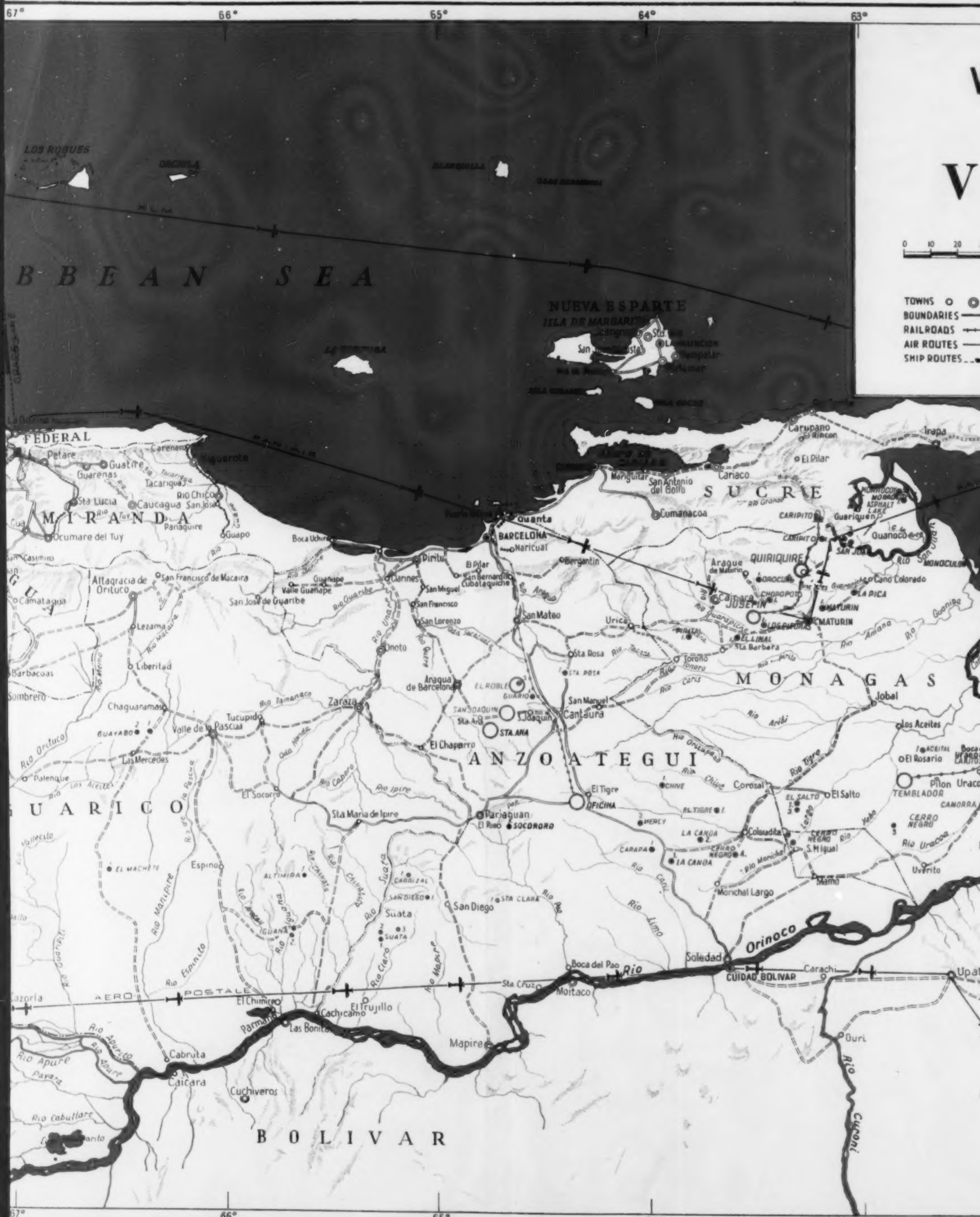
APURE
BOLIVAR
Rincon Hondo
Rio Arauca
San Antonio de Guachara
Caño Cunaviche
Cunaviche
Rio Cabullare



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ISLA DE MARGARITA
FEDERAL
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M I R A N D A
Panaquire
Ocumare del Tuy
Guapo
Boca Uchire
Quanta
BARCELONA
Naricual
Bergantin
Piritu
Clarines
El Pilar
San Bernardino
Cubataquiche
San Miguel
San Francisco
San Lorenzo
San Mateo
Urica
Onoto
Sta Rosa
Toron
Altagracia de Orituco
San Francisco de Macaira
San José de Guaribe
Valle Guanape
Camatagua
Lezama
Liberitad
Barbacoas
Sombrero
Chaguaramas
Valle de la Pascua
Tucupido
Zaraza
Aragua de Barcelona
EL ROBLE
GUARIO
SAN JOAQUIN
S.Joaquin
Sta Ana
STA. ANA
Cantaura
San Manuel
El Chaparro
Las Mercedes
GUAYABO
Palenque
A N Z O A T E G U I
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El Socorro
Sta Maria de Ipire
Pariaguan
SOCORORO
El Tigre
OFICINA
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Corozal
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Coloradita
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EL MACHETE
ALTIMIRA
CARRIZAL
SAN DIEGO
San Diego
STA CLARA
Suata
SUATA
IGUANA
Morichal Largo
Mamo
Soledad
Orinoco
CUIDAD BOLIVAR
Carachi
Upata
Boca del Pao
Moitaco
Sta Cruz
AERO POSTALE
Cazorla
El Chimire
Parmana
Cachicamo
El Trujillo
Las Bonitas
Mapire
Cabruta
Caicara
Cuchiveros
Rio Apure
Payara
Rio Caballare
B O L I V A R
Guri
Rio Cuyuni
Carupano
El Rincon
El Pilar
Irapa
Cariaco
Mariguitar
San Antonio del Golfo
Cumanacoa
S U C R E
CARIPITO
Guariquen
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ASPHALT LAKE
Araque de Maturin
QUIRIQUIRE
JUSEPIN
Caicara
MATURIN
Cano Colorado
LA PICA
EL LINAL
Sta Barbara
M O N A G A S
Jobal
Los Aceites
El Rosario
TEMBLADOR
Pilon
Uracoa
CERRO NEGRO
Uverito
Rio Guarapiche
Rio Amana
Rio Tigre
Rio Unare
Rio Guarico
Rio Limo
Rio Manapire
Rio Espino

62°
61°
WORLD PETROLEUM
OIL MAP
OF
VENEZUELA
DECEMBER 1939
Scale
MILES
KILOMETERS
LEGEND
International
Departmental
ROADS
OILFIELDS
WELLS
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Pump Stations
REFINERIES
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12°
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Macuro
to Barbados
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PORT OF SPAIN
TRINIDAD
GOLFO DE PARIA
San Fernando
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DELTA
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Caño Capure
Caño Cocuina
La Horqueta
Tucupita
Pilon
Uracoa
Barrancas
Upata
Guasipati
Tumeremo
Lake
Maracaibo
FALCON
El Concejo
Quiroga
MAP
OF
BOLIVAR DISTRICT

gamblers, saloon-keepers or small merchants that ran the cheap gaudy shops, they returned to the clean sanitary homes provided in the oil camps a few kilometers distant.

This fact, however, did not prevent the news stories from referring to the burned village as an oil town—an oil town in which not a single oil worker lived.

The other point is outstanding because of its absurdity. Some reports referred to the "oil film an inch thick covering the Lake" which is supposed to have contributed to the extent of the disaster. A glance at an atlas, a little calculating and editor or broadcaster could see that a one inch film of oil on Lake Maracaibo would require 4,000,000,000 bbls. of oil or three times as much as the entire output of all Venezuelan fields since discovery.

Now as to other so-called "facts" about the fire: not 800 but 28 people were lost. No rescue launch was burned with the loss of all on board. As a matter of fact the rescue-work of the oil companies was highly praised in the Venezuelan press which in this case displayed more regard for facts than their North American colleagues.

The facts and their distortion in this case have been gone into rather fully above, not primarily to correct the mistaken impression of neglect and indifference on the part of the oil companies which was disseminated by press and radio, but rather to emphasize how little is really known abroad of the remarkable medical, educational and social work being carried on by the oil companies in Venezuela.

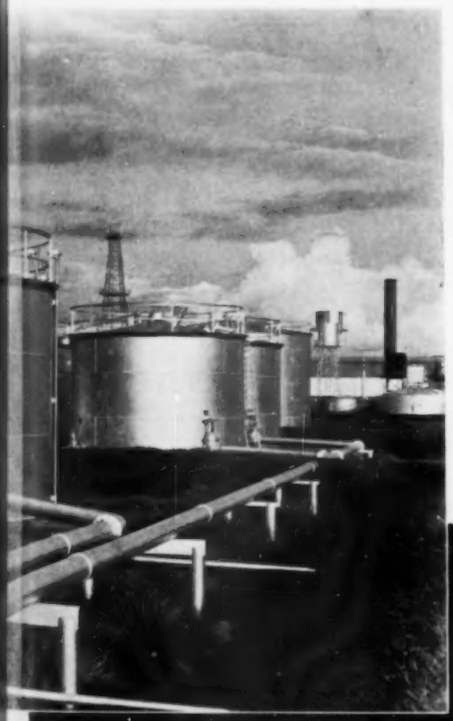
However, to finish with Lagunillas before turning our backs on the ruins of the city-on-stilts. Some two or three years ago the Venezuelan Federal Government, to whose social consciousness Lagunillas had become a major problem, initiated a project and with the full cooperation and substantial contributions of the oil companies started construction of a new town to which the inhabitants of Lagunillas could move. Planned according to the best civic design it was to furnish clean, sanitary homes for the lake people who had been accustomed to the squalor and filth of the recently destroyed town. This project resulted in the town of Ojeda, growing out of the cooperation of the Government and the oil companies. The latter provided the land, built streets and sidewalks, put in water and sewage systems, and supplied gas and electricity. The government built the houses and business places.

About a year ago Ciudad Ojeda was completed and turned over to the State of Zulia as a new place of residence for the people of Lagunillas. But, as the Venezuelan newspaper, CRITICA, recently pointed out, the people of Lagunillas offered resistance to the effort to move them from their filthy shacks into the clean and spacious new town which incorporated every modern convenience.

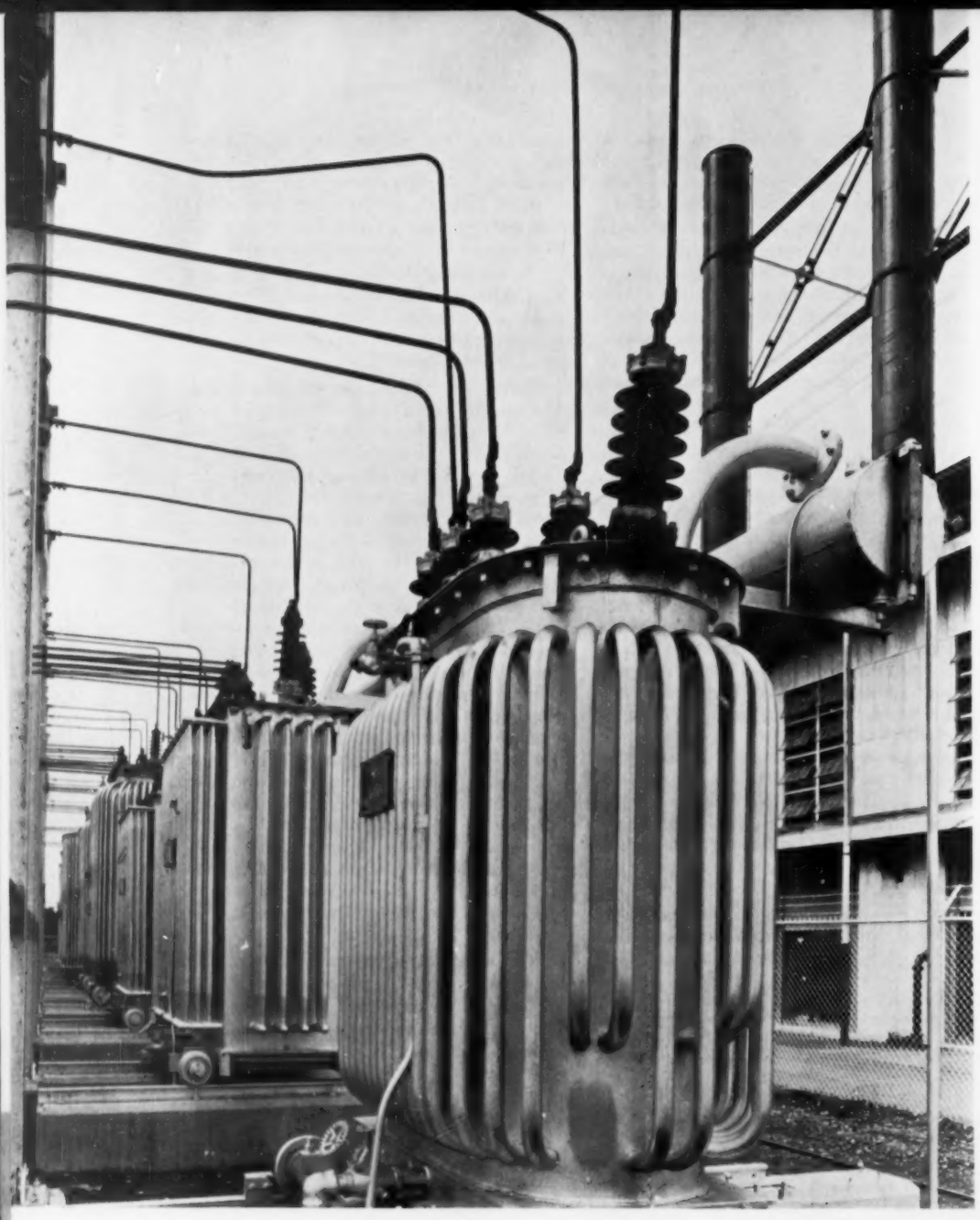
The horrors of the recent conflagration will have at least one beneficial result in bringing about this change as the Government has announced that it will not permit the rebuilding of the old town.

To turn now to a real Venezuelan oil town. At Cabimas, on the shore of Lake Maracaibo an oil company labor camp typical of those found adjacent to the oilfields up and down the lake, housing both foreign and Venezuelan labor, stretches out over a wide area. Long paved streets bordered by beautiful tropical trees divide the rows of houses. Flowers and shrubs flourish in the yards of some houses, others are comparatively bare depending on the taste and energy of the inhabitants. The houses themselves accommodate one, two or three families, are made of hollow baked clay tiles with corrugated asbestos roofs. The older houses have wooden frame work, protected from destructive insects by concrete foundation piles and oil baths around the base of the wooden supports. More recent dwellings are built with steel framework. The houses are wired for electricity, gas stoves are provided in the kitchens and modern bath and toilet facilities serve each family. Electricity, water and gas are provided by the company and are included in the nominal rent which runs about 10 cents a day for a three room house.

At one end of the camp is a sports field and across the road is the school for the oil workers children built and maintained as a cooperative endeavor by the three oil companies, Lago, Venezuelan Oil Concessions and Mene Grande.



Left, run down tanks of Shell's San Lorenzo refinery, and below, Socony-Vacuum's wildcat, Carrizal No. 1 seen from the doorway of a thatched cottage.



Substation where current from the Punta Gorda power station is stepped up from 6900 volts to 33,000 volts for transmission.

When it is considered that the oil companies have built over 6,000 modern homes for oil workers and have expended more than $16,000,000 in the construction of houses, hospitals, recreational and other facilities for their workers a very different impression emerges from the one implied by newspaper accounts of the burning of Lagunillas.

As a matter of fact, the oil companies operating in Venezuela as well as the present Federal Administration of that country have done more to better the condition of the worker in health, housing, medical attention, education facilities and the encouragement of sport than has been done, perhaps, any where else in the world by government and industry in cooperation. No one, least of all the oil company officials in charge of this work, assumes that it springs from a purely philanthropic motive. It was realized from the beginning that for genuine stability of the industry over the long term development that was contemplated, the industry must be manned by Venezuelan workers. The companies assumed the obligation, not only to return to the government a fair share of the value of oil produced in taxes and royalties, but also to furnish employment opportunities to the Venezuelan worker. For an adequate domestic supply of contented and efficient labor in a country as little developed as Venezuela was ten or fifteen years ago, pleasant and healthy living conditions were essential. Heretofore the attitude of the government has been entirely cooperative and the work of the companies has borne fruit in a greatly increased standard of living, and standard of health. And as the health and contentment of the workers improved, they have proved themselves adept at even the more complicated tasks of oil field development.

Today Venezuelan drillers are found on practically every drilling rig with the possible exception of wildcats, where unknown formations and pressures may be encountered. Venezuelan drivers man the trucks and tractors, behind their weird masques weld the pipelines, and bend over the typewriters and comptometers in the air conditioned offices of Maracaibo.

It may be said that actually no labor problem exists in the oil industry. In some fields workers are organized into unions, or syndicates as they are known in Venezuela and their representatives cooperate with company officials in the solution of individual problems and grievances. The sound attitude of Venezuelan law is that not only the rights of the syndicates but their obligations and limitations as well, should be fully defined and enforced. Syndicates are rigidly excluded from political activity. In those respects Venezuelan labor laws are in advance of those in the United States.

One of the first problems confronting the oil companies when they began development of Venezuela's oil resources was the suppression of the anopheles mosquito which thrived in the swamps and marshes around Lake Maracaibo and which was responsible for the prevalence of malaria. The Shell Company, being the first in the field, commissioned the Liverpool School of Tropical Medicine to investigate the problem and subsequent action by the company based on reports furnished by the School's representative has practically eliminated this disease. Swamps have been drained or treated, brush has been cleared away or sprayed with kerosene and gas oil and protective screens of trees have been planted around the dwellings.

The Shell hospital at Maracaibo is said to be one of the world's leading tropical hospitals. Free medical service to all employees and their families is provided through hospitals and dispensaries under the direction of fully qualified Venezuelan doctors and nurses.

At present the Shell Company has a hospital at Maracaibo furnished with 80 beds a staff of four doctors, a pharmacist, a laboratory technician and 41 nurses. There is, of course, every kind of modern X-ray and other equipment to be found in the best hospitals of large cities in Europe or in the United States. The hospital at Lagunillas which is a joint venture of Shell, Lago and M. G. O. C. has accommodations for 50 in-patients, four doctors, 22 nurses, two pharmacists and a laboratory technician. At Cabimas this company maintains only an emergency hospital with two doctors and a pharmacist. No larger establishment is required here because a new municipal hospital was recently completed. The building for this hospital was contributed by the Shell Group, Mene Grande Oil Company and Lago Petroleum Corporation.

At the Mene Grande field Shell has built a $90,000 hospital with 40 beds and a staff of

two doctors, one pharmacist, a laboratory technician and 11 nurses. The company also maintains an emergency hospital at Casigua with 20 beds and patients travel for many miles to receive treatment here or to be conveyed in a Shell plane to Maracaibo if the malady proves too serious for treatment in the emergency hospital.

These hospital facilities represent only the contribution of one company. The other two companies maintain similar facilities in proportion to their requirements and the extent of their operations. Mene Grande Oil Co. C/A (Gulf), for instance, has an 80 bed modern hospital with a staff of four physicians, nine registered nurses, a pharmacist and X-ray and laboratory technicians at company headquarters in Maracaibo. Mene Grande also maintains an emergency hospital at Cabimas equipped to handle accident cases and even major surgical operations. Like Shell and Lago, Mene Grande contributed to the construction of the Municipal Hospital building. Mene Grande's partipation in the Lagunillas hospital of the oil companies has already been referred to, but the company also operates its own dispensary and pharmacy here. In Taparito they operate a modern and well equipped dispensary and first aid station housed in a building of stransteel construction and serviced by first aid men, physician and surgeon, and nurses. It should be borne in mind that drugs and medicines from pharmacy and dispensary as well as treatment in the hospitals are free to all employees and their families.

As Mene Grande is carrying on important operations in Eastern Venezuela, where their Oficina field is being rapidly developed, their oil terminal of Puerto La Cruz is being built and their 100 mile, 16 in. pipeline was recently completed, they have operated medical facilities here too and are engaged in the construction of two more hospitals. Clinics have been maintained by Mene Grande at Barcelona, San Tome, Oficina and Ciudad Bolivar. Limited hospitalization was available at Barcelona, Oficina and Ciudad Bolivar. Serious cases were transported by air to Standard of Venezuela's Caripito hospital or to the company's own hospital at Maracaibo. In accident cases requiring complicated treatment the company has even sent its employees to hospitals in the United States.

The two hospitals now under construction by M. G. O. C. in Eastern Venezuela are a 60 bed hospital in San Tome and a 20 bed hospital at Puerto La Cruz both furnished with the most modern equipment available and all the auxiliary facilities necessary for efficient operation of a modern hospital. That employees may enjoy the attention of doctors fully conversant with the latest developments in medical science, the company has arranged to send its Venezuelan doctors to recognized medical centers in the United States from time to time for periods of training.

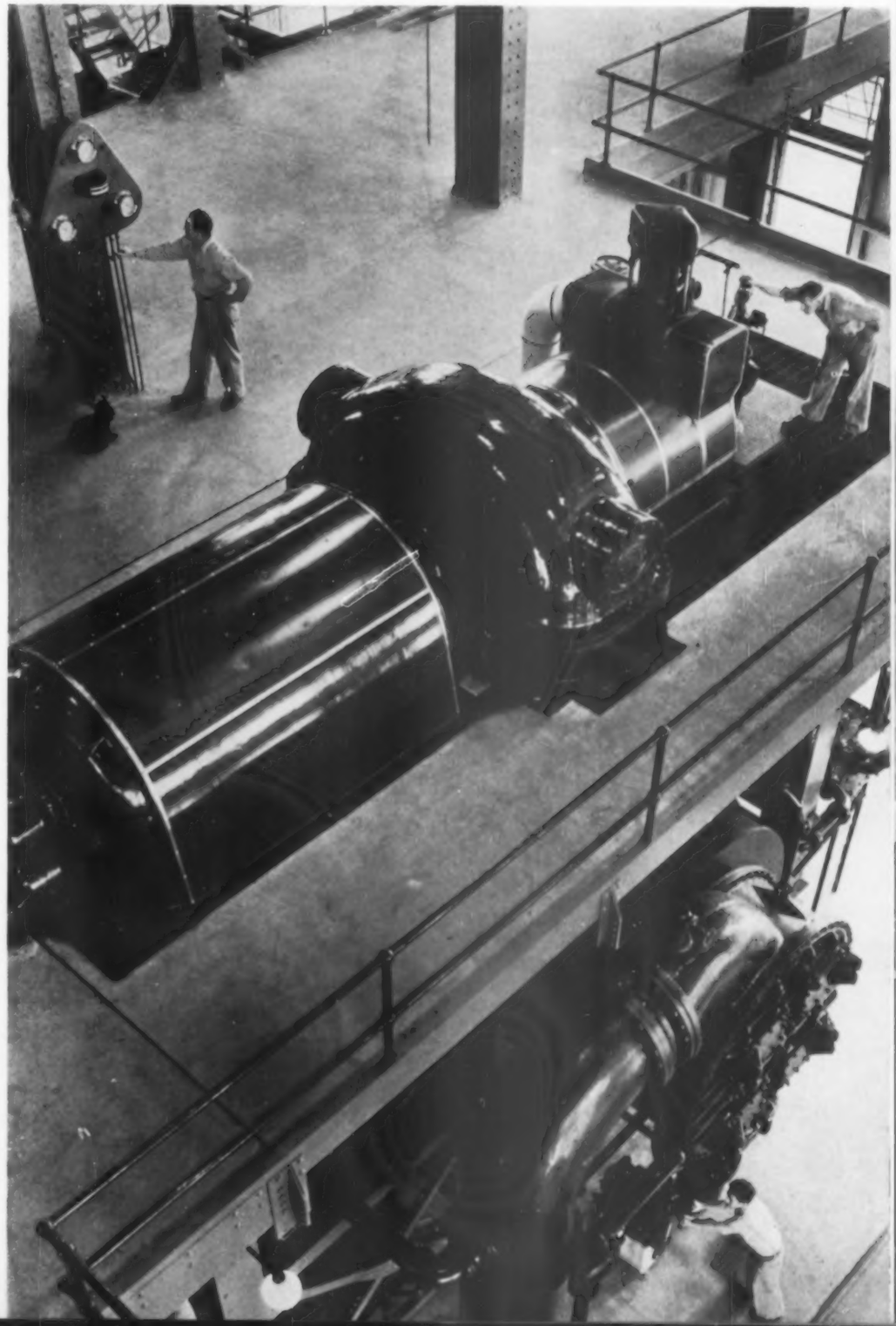
The Jersey Standard companies, Lago Petroleum and Standard of Venezuela also have spent hundreds of thousands of dollars to build hospitals at Maracaibo, Lagunillas, La Salina, Cumarebo and at Caripito and to build and equip dispensaries and pharmacies in all operating fields. No effort or expense has been spared to safeguard the health of employees.

An example of the sustained and consistent effort to educate workers, unaccustomed to handling heavy machinery and equipment, to protect themselves against accidents was furnished by W. L. Link of the Industrial Relations Dept. of the Lago Petroleum Company. This program which may be taken as typical of the accident prevention work of the three major companies operating in Venezuela reduced the accident frequency rate from 216 for the last six months of 1928 to 18.97 for the first six months of 1939.

In summarizing the Safety First campaign undertaken by Lago in 1928, Mr. Link explained:

"In seeking a solution of the problem created by an astonishingly high frequency rate of industrial injuries, one of the first things that had to be done was to establish records that would give a true picture of conditions; and then obtain close cooperation between supervisors, foreman, doctors and the workmen themselves.

"As accurate information became available, considerable reduction in the frequency rate was possible through the correcting of such deficiencies, as improper reporting of injuries,



One of the 5000 kw. turbo generators in the Lago power station on the shore of Lake Maracaibo.

Three handle slip from Texas being unloaded in the heart of Venezuela at Socony-Vacuum's wildcat, Carrizal No. 1.

laxity in the investigation of basic causes and the correction of same, the improper follow-up of the injured workmen who failed to return to their job when the severity of the injury did not warrant their absence therefrom, etc. With those deficiencies more or less under control, an educational campaign was undertaken which consisted of a long range program, supplemented by quick-action efforts.

"The long range education involved group instruction, classes in first aid, practical demonstration of the proper handling of material, etc. The first Safety Committees were organized among the Venezuelan supervisors late in 1928, mass meetings, safety programs, the placing of posters and many similar standard practices were early introduced, and have been continued ever since. In 1933 classes in First Aid were started among the skilled workmen, and in July of that year, the first "First Aid Contest" ever organized in Venezuela was held between eight full Venezuelan teams. The celebration was staged on July the 5th (the national day of Independence), before a large crowd that included representatives of the Federal, State and Municipal governments.

"The quick action steps included various interesting features that proved most effective having been adapted to the particular psychology of the workmen involved. Two of these are deserving of some mention.

"Satisfactory results" continued Mr. Link, "were obtained by the use of pay-envelope enclosures. Despite the fact that when the campaign started in 1928 only a small percentage of the workers could read it was found that they put the notices in their pockets until such time as one of the *compañeros* could read them aloud. The use of enclosures therefore, proved doubly effective in obtaining the desired results, as such interest not only impressed the worker himself, because of his efforts to hear the message carried, but the one who read it was also impressed. Further to hold the interest, each weekly card would be printed on a different colored paper, thus avoiding the possibility of the men thinking that they were the same as the ones used the week before.

"Another safety campaign feature, originated in the early months of 1929 was known as the Free Lottery and proved so effective that it was subsequently adopted by the other companies in Venezuela as well as many producing companies in other nations of South America. The feature was based on the deep desire to take a chance on any raffle or lottery that might be offered. The company announced a free lottery for all its workmen, large cash prizes were offered, every workman was eligible to participate; tickets were given free, to those who worked for the period of the contest without suffering a disabling injury. These workmen had never heard of a Safety Contest nor "Safety First" (the slogan used by the oil companies was "EVITE ACCIDENTES"), but it looked like an easy way to win some cash. The workman thought it was simple, and it was; but it was effective for it put 3,500 workmen to thinking about avoiding accidents. They became safety-minded by this method and within a few months, by so obtaining the help of the workmen themselves, accidents were reduced 50 percent."

Three primary needs of Venezuela are sanitation, education and transportation. The oil companies, to increase the efficiency of their workers, have done much to safeguard health and to prevent them from suffering accidents as a result of the new type of labor required by the introduction of the oil industry; they have not, however, neglected the other two primary needs which it is hoped will contribute to the stability and raise the standard of living of the nation.

The Shell companies, for instance, maintain nine grade schools with an enrollment of 1,343 pupils and 24 teachers. The company conducts classes in English and typewriting at all the oil camps. Recently a Berlitz English teacher has been engaged for employees in the Bolivar district and, if the experiment proves successful, others will no doubt be engaged.

Venezuelans have been trained as drillers, starting with necessarily close supervision but now capable of dealing with most problems with very little supervision. Attendance at evening classes of the Sucre College in Maracaibo is encouraged by the company's offer to pay all fees and the cost of books to those employees who secure diplomas. Commercial courses are given in this college to develop bookkeepers, stenographers, clerks and typists. Nurses are trained in the company's hospital, sons of field workers are sent in groups to the Trade School in Caracas at company expense. Mechanics, electricians, welders and draughtsmen are being trained in the field. Scholarships are provided for four students in the Geological College in Caracas and outstanding students are provided with funds to continue their studies in the United States.

Lago Petroleum Company has built five schools and has spent over $130,000 on them. Some 2,000 children have received instruction in the Lago schools. Opportunities are furnished for mechanical and clerical instruction at company expense and English classes are conducted. All drillers in settled fields are Venezeulans and only wildcat drilling is confined to foreign experts. Scholarships for the Geological College and for the Trade School in Caracas are set up by the company.

The matter of language is treated as of equal importance for Venezuelans and foreign staff. For while Venezuelans may study English if they wish, foreign staff members must learn Spanish if they expect to continue in Venezuela. In the first rush of development, North American oil men were hastily summoned to the Venezuelan fields. Due to their inability to speak or understand Spanish a class of sub-bosses grew up, recruited mainly from the West Indian negroes who could speak both English and Spanish. It did not take long, however, to discover that this system was open to serious objection. Venezuelan workers, who were willing to take orders from the foreign experts, resented having these commands transmitted through foremen whom they had no reason to believe knew more about the industrial problems than they did themselves. In the oil camps today, foreign staff may be seen studying Spanish in the club, the recently cleared mess hall or any other convenient spot. And in the field, Texas and Oklahoma tool pushers discuss problems with Venezuelan drillers in Spanish larded with amusing idiomatic expressions covering technical terms for which there is no exact Spanish equivalent.

Mene Grande Oil Co. has established a school in Cabimas and another in Lagunillas with a capacity for 200 pupils in each. The buildings are of modern stran-steel construction, equipped with furniture imported from the United States and are staffed by a principal and five teachers in each school. These schools are under the direct supervision of the governmental educational authorities but all operating expenses are borne by Mene Grande.

Work on the all-important dyke at Lagunillas progresses almost constantly. Note difference in land level at left and water level at right.

An ancient cannon rescued from the sea off the coast of Venezuela.

At Taparito the temporary school operated by M. G. O. C. has given way to the ultra-modern school erected and operated jointly by M. G. O. C., Lago and V. O. C.

In the East, Mene Grande operates schools for the children of Venezuelan workmen at Oficina and Santa Ana and is constructing a modern school building at the San Tone camp designed to accommodate 160 pupils and so constructed as to permit easy enlargement if this should prove necessary.

One of the most important public works completed in all Venezuela was the construction of the highway from Puerto La Cruz to Oficina paralleling the Mene Grande pipeline. This road permits travel from Guanta on the Caribbean all the way to Ciudad Bolivar on the Orinoco, and it will be seen by a glance

(Continued on page 114)

Extensive Public Works Program Based on Scientific Study

By E. J. Aguerrevere, *Minister of Public Works*

CARACAS, 22 NOVEMBER 1939

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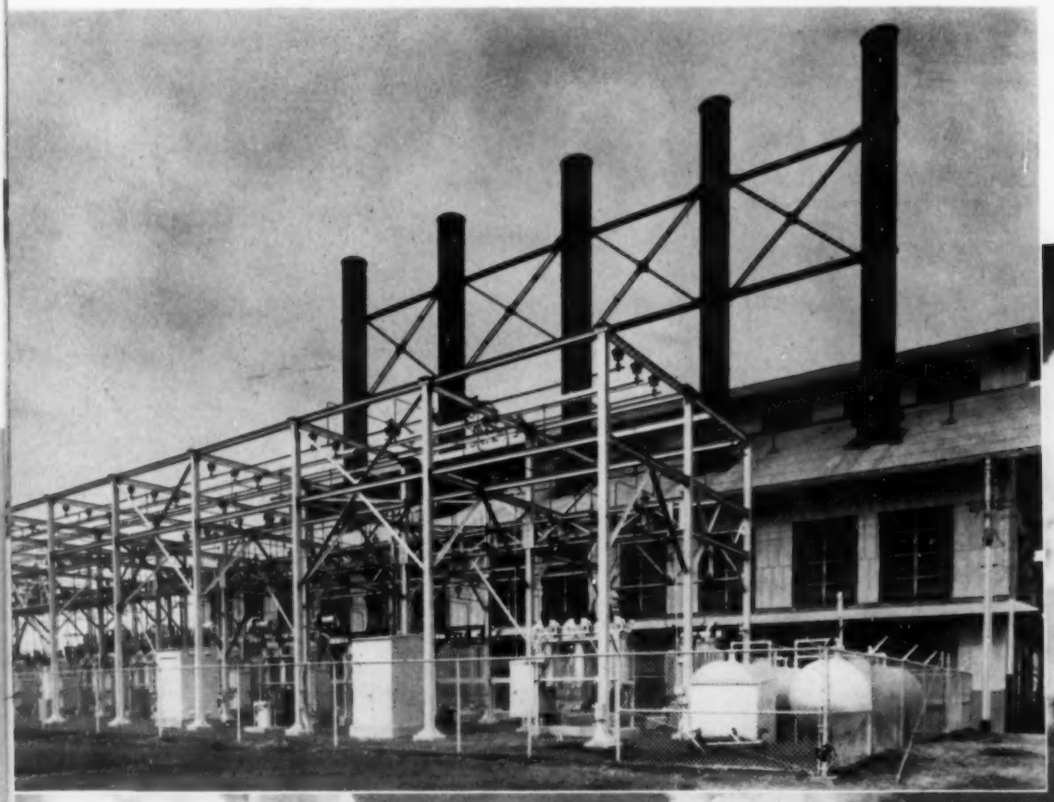
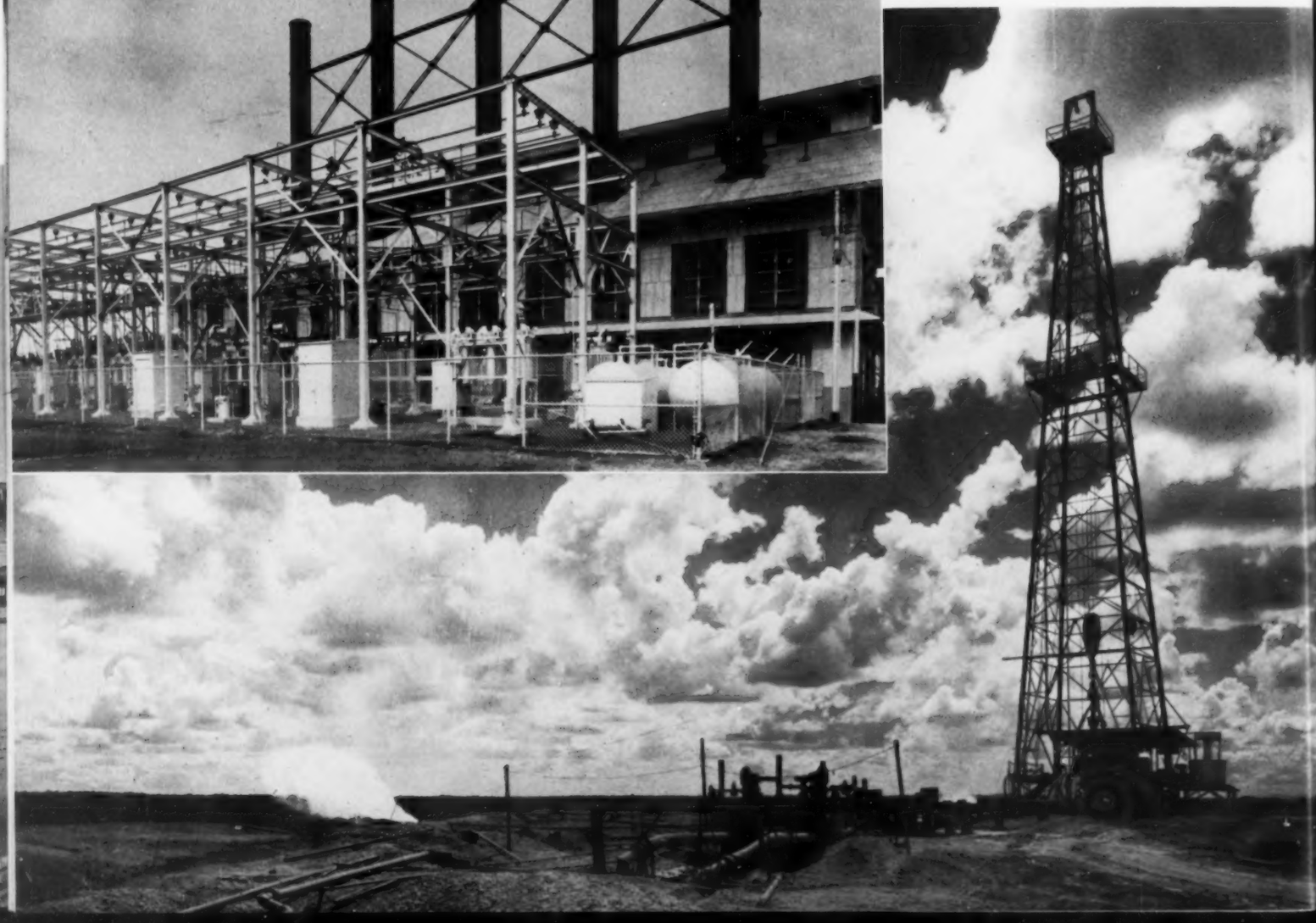
Highway construction in Venezuela has reached an unusual scientific stage of development. It is only after a consciencious preliminary study of the various projects and their estimated costs, that final plans are elaborated and the corresponding works executed. The Ministry has succeeded in negotiating, through a system of public bids, the construction of such important roads as the highways from Coro to Altagracia, from Coro to Churuguara, and the one which goes to Pariaguan from Valle de la Pascua. This construction is in addition to the maintenance of 2,773 km. of roads in service. The new ones being constructed are almost as long, amounting to 2,080 km., and in their construction, we are following the latest methods suggested by North American experience. The Ministry

(Continued on page 70)

Dr. E. J. Aguerrevere, minister of Public Works: Below, Punta Gorda power station where Lago maintains its own public service in the Bolivar Coastal district and one of the fields—Jusepin—that is opening up Eastern Venezuela.





Labores del Ministerio de Obras Publicas

Por E. J. Aguerrevere, *Ministerio de Obras Publicas*

INVITADO amablemente para escribir en la edición del WORLD PETROLEUM, que estará dedicada a Venezuela en el próximo mes de diciembre, he pensado que lo mejor que podía hacer era una breve reseña de las obras públicas que se llevan a cabo en la actualidad. Estas pueden reducirse a los ramos de Vías de Comunicación, Obras Hidráulicas y Edificios.

1. Por primera vez en Venezuela logra hoy la práctica de la construcción de carreteras inusitado adelanto cientifico. Solo después de concienzudo estudio preliminar de proyectos y presupuestos se procede al trazado y se ejecutan las obras; de modo que ya ha podido el Ministerio sacar a pública licitación importantes vías, como las carreteras de Coro a Altagracia, de Coro a Churuguara y la que lleva a Pariaguán desde Valle de La Pascua, esfuerzo paralelo al que desarrolla en la conservación de DOS MIL SETECIENTOS SETENTA Y TRES KILOMETROS (Km. 2.773) de carreteras en servicio. Las nuevas que se construyen miden casi tanta extensión, DOS MIL OCHENTA Y DOS KILOMETROS (Km. 2.082) y en estos trabajos se siguen las normas que aconseja la práctica norteamericana. El Despacho tiene actualmente en estudio UN MIL TREINTA Y OCHO KILOMETROS (Km. 1.038) de nuevas carreteras.

Un progreso digno de mención especial se ha introducido con la intensificación que ultimamente alcanza el empleo de las modernas máquinas con que se abarata la obra de mano y se perfecciona su más correcta ejecución, asi en el mantenimiento de las obras hechas como en las nuevas que se emprenden. El dinero invertido por este concepto desde que inició sus labores el Gobierno del General López Contreras, se resume en las cifras siguientes:

1.936	Bs.	391.748,06
1.937	"	550.353,71
1.938	"	852.809,33
1.939	"	1.267.475,42
Total	"	3.062.386,52

Estas máquinas son mezcladoras y aplanadoras se diversos tipos y marcas, tractores, niveladoras, palas mecánicas, bombas, compresores, grúas, autopatroles, etc.

Debo hacer asi mismo hincapié en los trabajos de laboratorio que lleva a cabo la División correspondiente, anexa al Departamento Directivo de Vias de Comunicación. En dicho Laboratorio, terminado en marzo de 1.938, se hacen continuas investigaciones acerca de los diversos materiales y actualmente se ensayan las maderas del pais. Para estos trabajos contrató el Ministerio los servicios de un experto norteamericano.

La red ferroviaria aunque continúa en crisis económica provocada hace varios años por la competencia de los automotores que circulan por los caminos, sigue prestando sus servicios dentro de los limites de las respectivas concesiones. El Ferrocarril Central, y el de Santa Bárbara a El Vigia son hoy propiedad de la Nación. Además la red ferroviaria comprende cinco compañias extranjeras y dos venezolanas. No ha mucho se dió por contrato la construcción del ferrocarril de El Palito a Palmasola que empalma con el de Bolivar y con el de Puerto Cabello a Valencia.

Las vias maritimas y fluviales cuentan con los notables progresos que representan los costosos trabajos de Puerto Cabello (nuevos muelles, dragado del canal), la nacionalización de los puertos de La Guaira, Cumaná y Carúpano, los contratos celebrados con responsables firmas extranjeras para construir los dos últimos y el de Ciudad Bolivar, las mejoras del de Maracaibo, las obras de limpieza del rio Tuy y otras varias.

La navegación aérea prospera tambien con el acondicionamento de los campos de aterrizaje y la mejora de varios aerodromos.

Para terminar lo referente a las vias de comunicación señalaré 1° el contrato celebrado por el Ejecutivo Federal, representado por el Ministro de Hacienda, con el señor W. T. S. Doyle en nombre de varias Compañias petroleras (Caribbean Petroleum Corporation, Venezuelan Oil Concession Ltd., Colon Development Ltd., Venezuelan Oil Development Co., Petroleum Utensils Co.), para la construcción de la carretera de Motatán a Mene Grande; 2° el celebrado asimismo con el señor León C. Booker, representante de la Standard Oil Company of Venezuela, Petroleo Lago, Lago Petroleum Corporation, Internationl Petroleum Co., para construir las siguientes obras públicas hasta invertir Bs. 4.000.000.00: Muelles, Aduana y Resguardo de Caripito; carreteras de éste a los Morros de San Juan y de Caripe - Aragua de Maturin - Quiriquire; Güiria-Irapa-Yaguaraparo; ampliaciones y mejoras del Hospital de Maturin; saladero y frigorifico en Caripito y Acueducto de

(Pasa a la pagina 71)

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Extensive Public Works Program Based on Scientific Study

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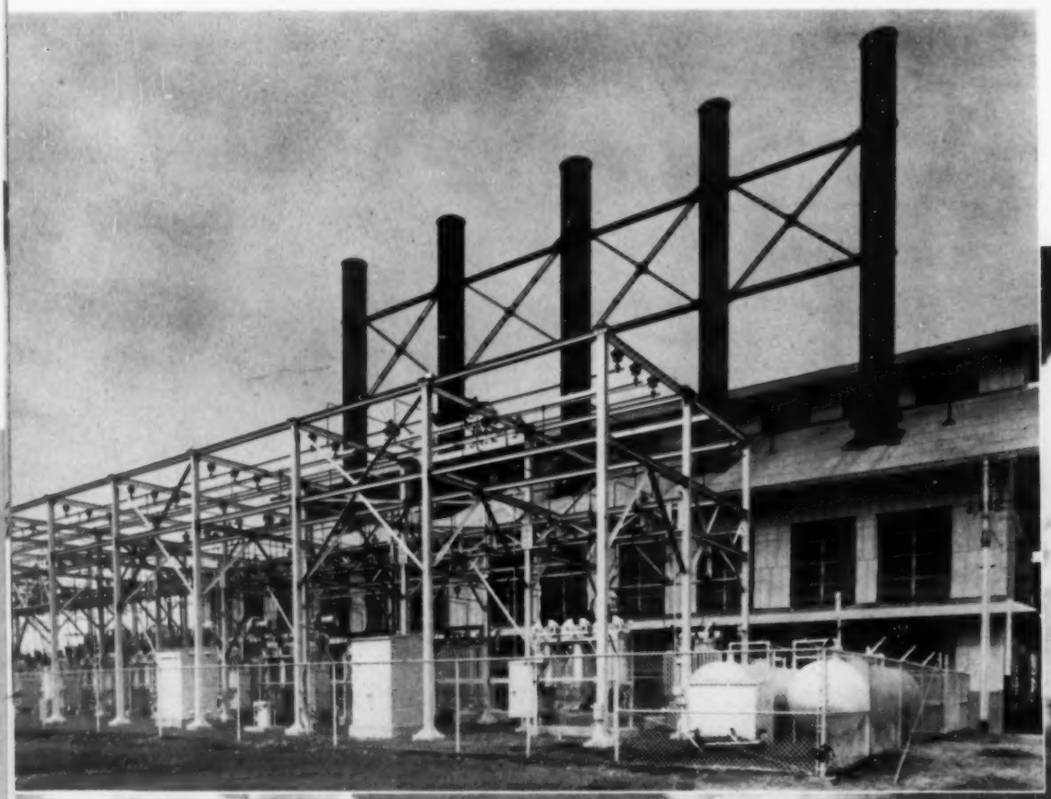

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(Pasa a la pagina 71)

Valves on the 2400 ton per day Shell-designed San Lorenzo refinery noted for its high degree of automatic control.

actually has under study the construction of some 1,038 km. of new highways.

A development worthy of special mention is the marked increase noticed in the employment of modern machinery to reduce the cost of work and to perfect further its execution, both, for projects already completed and for the new ones to be undertaken. The amounts invested along these lines since the inauguration of General Lopez Contreras' government, are summarized in the accompanying table.

Expenditures on Public Works Machinery

1936	Bs.	391,748.06
1937	"	550,353.71
1938	"	852,809.33
1939	"	1,267,475.42
Total	"	3,062,386.52

The machines being used now include mixers and rollers, of various types and makes, tractors, levelers, mechanical shovels, pumps, compressors, cranes, autopatrols, etc.

I must also make special mention of the laboratory work now being conducted by the appropriate section of the Ministry, annexed to the Direction of Ways of Communication (*Departmento Directivo de Vias de Comunicacion*). In this laboratory, completed in March 1938, continuous investigations are being made regarding the various materials to be used, and now at present local lumber is being tested. For these works, the government contracted the services of a North American expert.

The railroad system, although still suffering from an economic crisis, brought about several years ago by competition from the various bus lines which now traverse the highways, is still functioning within the terms of the respective concessions. The Central Railroad, and the one from Santa Barbara to El Vigia, are owned today by the nation. The railroad system comprises besides, five foreign companies, and two Venezuelan concerns. Not long ago, a contract for the construction of a railroad from El Palito to Palmasola, which joins with that of Bolivar, was awarded.

The maritime and river systems, have also made notable progress represented in costly works at Puerto Cabello (new piers, dredging of the canal), the nationalization of the ports of La Guaira, Cumana, and Carupano, the contracts negotiated with responsible foreign firms for the construction of the two ports last mentioned, and of the one of Ciudad Bolivar, the improvements in the port of Maracaibo, the works for cleaning the Tuy river, and several others.

Aerial transportation is also developing with the conditioning of landing fields, and with the improvements made in several of the airports.

In concluding my remarks on transportation and communication, I shall mention:

First: The contract negotiated by the Federal Executive, represented by the Minister of Finance, with Mr. W. T. S. Doyle, on behalf of several oil companies: (Caribbean Petroleum Corporation, Venezuelan Oil Concessions, Ltd., Colon Development Ltd., Venezuelan Oil Development Co., Petroleum Utensils Co., for the construction of the highway from Motatan to Mene Grande;

Second: The contract made with Mr. Leon C. Booker, representative of the Standard Oil Company of Venezuela, Petroleo Lago, Lago Petroleum Corporation, International Petroleum Company, for the construction of the following public works, investing up to Bs. 4,000,000 on piers, custom house, and custom house guard's building at Caripito; highways from Caripito to the Morros de San Juan and of Caripe-Aragua de Maturin Quiriquire; Guiria-Irapa-Yaguaraparo; extensions and improvements to the hospital at Maturin; salting and freezing plants in Caripito, and an aqueduct at Yaguaraparo;

Third: The contract negotiated with the Mene Grande Oil Company to build the highway from Coro to Altagracia, and several other works, involving an expenditure of Bs. 2,500,000.

The Ministry has sent, on various occasions several engineers to study the problem of the old salt mines of Araya, and to devise some means to increase their production and to organize their sound exploitation. Lately, a North American expert in construction and operation of salt mines, has been engaged to study the situation and suggest what should be done to place Araya on a production basis equal to that of the most modern installations.

As regards hydraulic works, the Government has given preferential attention to the water and sewerage works in Caracas, and in countless interior towns in the country. Important improvements have been made in the technique for the execution of water works, and although up to a little more than five years ago, our aqueducts required rather elementary studies which matched the kind of work to be undertaken; a canal or pipe line to carry the waters of some brook, a reservoir located on an elevation or a distribution system, always inadequate which suggests that all our aqueducts constructed with such technical definciency, require a general

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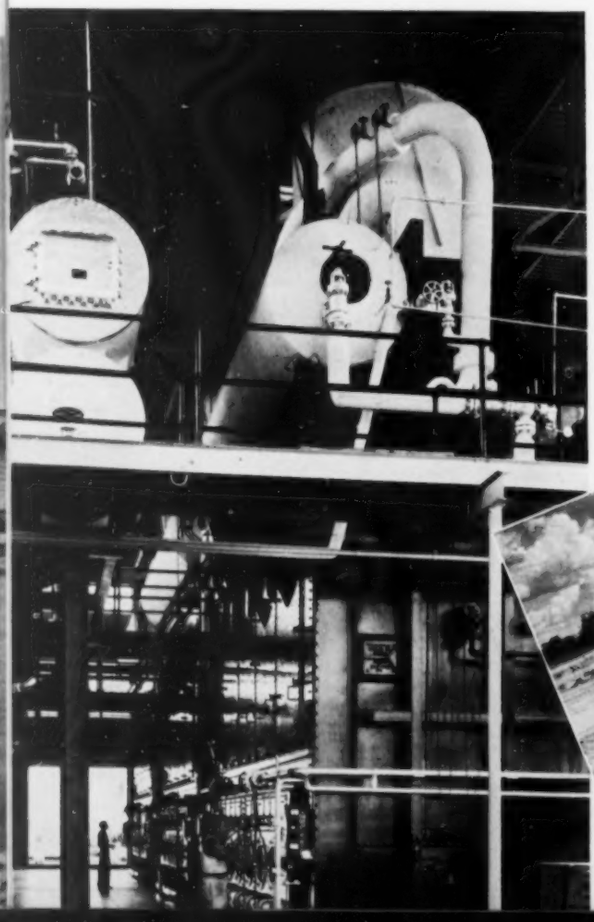

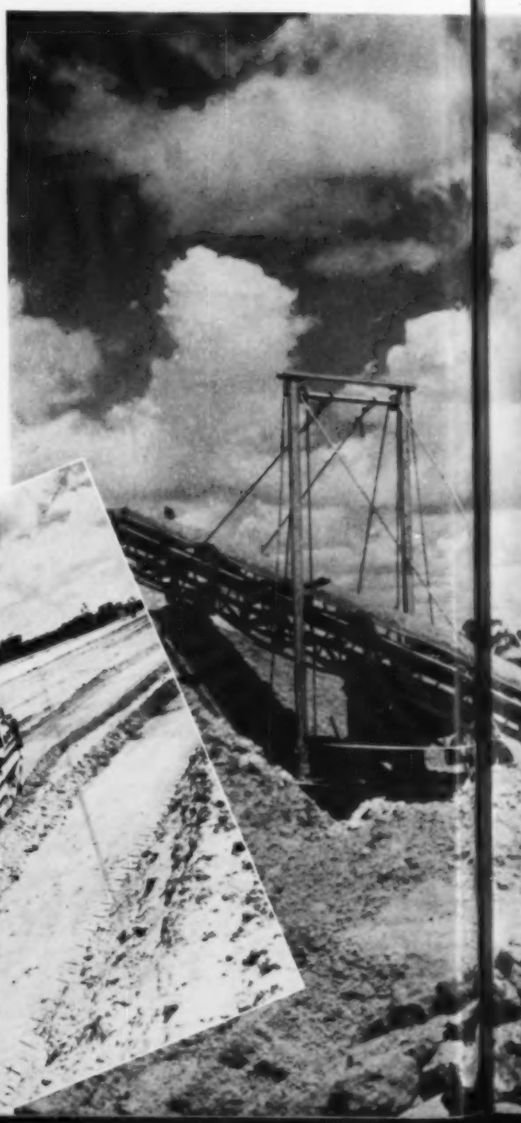

Left, interior of Mene Grande's Las Marochas power station; below, building the Guanta-Ciudad Bolivar road which parallels M. G. O. C's pipeline; and right construction work on the pipeline terminal at Pto. La Cruz.

Yaguaraparo; y 3° el que se celebró con la Compañía Mene Grande Oil Company para construir la carretera de Coro a Altagracia y otras obras hasta por Bs. 2.500.000.00.

Con el fin de mejorar y aumentar la producción de las antiguas Salinas de Araya y hacer su racional explotación el Ministerio envió en oportunidades varias Ingenieros del servicio para el estudio del problema. Ultimamente contrató con un técnico americano, experto en construcción y manejo de Salinas el estudio de lo que ha de hacerse para colocar a Araya en una situación de producción igual a las instalaciones más modernas.

2. En el ramo de obras hidráulicas el nuevo Gobierno ha dado atención preferente a las obras del acueducto y alcantarillado de Caracas y de sin número de poblaciones del interior del país. En la técnica de acueductos se han hecho mejoras de importancia, pues si bien "hasta hace poco más de un lustro nuestros acueductos no requerían sino estudios asaz elementales, concordantes con la obra que había de construirse: un canal o tubería que condujese las aguas de una fuente, un estanque alto de almacenamiento y una red de distribución siempre inadecuada" por donde se ve que que todos nuestros acueductos construidos con tal deficiencia técnica requieren revisión general", ahora en cambio, se piden "estudios más graves y minuciosos: las condiciones de potabilidad en todo tiempo, tanto en sequía como en tiempo lluvioso, han de estudiarse primordialmente mediante análisis físicos, químicos y bacteriológicos . . ." Para satisfacer las exigencias de la técnica moderna el Ministerio paga la colaboración de un Ingeniero Sanitario norteamericano de reconocida competencia.

Y para la perforación de pozos profundos tiene contrato con otro especialista y un servicio de geología de cuyos resultados es ejemplo la solución del problema del Acueducto de Maracaibo: 16 pozos profundos localizados por el geólogo Pedro I. Aguerrevere, a 15 kilómetros de la ciudad y perforados por la Martin Engineering Company, han producido un caudal de 30.000.000 de litros cada 24 horas.

Las obras del alcantarillado de Caracas se rigen por normas y especificaciones "no copiadas de libros ni de sistemas extranjeros, sino adaptadas al medio y las costumbres". Con paciencia y técnica, a pesar de lo ingrato del medio, se llegó durante el año de 1.938 a reducir los costos por unidad de obra en un 40%. Las diferencias entre las cantidades calculadas en los presupuestos y las de los materiales usados en la realidad no pasan del 5% por exceso o por defecto. El Ministerio ha podido merced a la colaboración de la División de Cloacas adjudicar las obras por contrato y sacarlas a licitación pública.

Trabajos de cloacas se han venido ejecutando en Ciudad Ojeda (ya terminados), en Valencia, Barquisimeto, Maracaibo, Puerto Cabello, Valera y San Fernando de Apure. Empléase el sistema de canalización separada y construyen las obras las personas a quienes dió el Ministerio la buena pró en las respectivas licitaciones.

He aquí un esquema de los trabajos de obras hidráulicas en el período de 1.936 a 1.939:

	En Servicio	En Construc.	Por Empezar	En Est.
Acueductos	15	43	9	20
Obras Sanitarias	9	7	5	12
Defensa de poblaciones	—	3	—	4
Obras de Riego	1	2	1	3

Al presente tiene en estudio el Despacho y ejecuta simultáneamente trabajos de riego en los Valles del Tuy, donde se abarcará una extensión de 3 a 4.000 hectáreas. Tambien se estudian regadíos en los alrededores de la Laguna de Valencia, tan aprovechables en labores agrícolas (cultivos varios). Ultimamente considera el Ministerio posibles riegos en San Carlos de Cojedes y Guanare (de 6 a 7.000 hectáreas en el primero y aproximadamente unas 1.000 en el segundo).

3. Interminable sería este artículo si me pusiera a describir los trabajos del Ministerio en el ramo de edificios. Cuenta el Despacho con una colaboración bien organizada que procura de acuerdo con las otras Direcciones llegar a estatuir las especificaciones técnicas

(Pasa a la página 126)

International News Photos

Dr. Diogenes Escalante, Ambassador to the United States from Venezuela.

RECIPROCAL TRADE AGREEMENT Lowers Tax on Imports to the United States

Convention Concluded with Venezuela Reduces by One-half Import Tax on Limited Quantity of Crude Petroleum and Products—Emphasizes Good Relations Between the Two Nations.

ON NOVEMBER 6, 1939 representatives of the governments of the United States and Venezuela signed a reciprocal agreement which had been under negotiation for several months. The convention is expected to increase to some extent the exchange of commodities between the two countries although this trade already was of large dimensions. Aside from its commercial effect, however, the treaty is regarded as an important testimonial to the friendship and good will existing between the two nations.

By its terms the provisions of the agreement will become effective provisionally on December 16, 1939 and will enter into full force thirty days after ratification by the Venezuelan government and proclamation by the President of the United States. It is to remain in effect until December 15, 1942, but may continue indefinitely beyond that date subject to termination on six months notice by either of the contracting parties.

Among the important exports from the United States on which Venezuela agrees to reduce customs duties are wheat, flour, cereals, canned fruits, prepared milk, lard, paints and enamels, radios, refrigerators, steel plates, engines and pharmaceutical products. On other manufactures such as motor cars, trucks and accessories, which constitute one of the largest groups of exports from the United States to Venezuela present duties are bound against increase. Altogether 96 items appear on the list of Venezuelan imports affected by the treaty. In 1938 the value of United States exports affected by these schedules was $18,712,000 or approximately 36 percent of the total volume of exports to Venezuela.

In exchange for the numerous concessions in duties on its exports the United States grants a reduction of 50 percent in the tariff rate on crude petroleum, fuel oil and gas oil. This agreement is restricted however, by a limitation of the quantity of such products that can enter the United States at the lowered rate of duty in any one year to five percent of the total quantity of crude processed within the continental United States in the twelve months preceding. On the basis of runs to stills in 1938 actual imports of crude oil and products during the past five years have been about three percent of this total so that the possible increase under the reduced tariff provision would be about two percent or less than 25,000,000 bbl.

On December 12, President Roosevelt issued a proclamation assigning proportionate share of imports admissible at the reduced rate of duty during this period from Dec. 16, 1939 to Dec. 31, 1940, to various countries on the basis of their actual exports to the United States during the first ten months of the current year. This proclamation in part is as follows:

> "Under the terms of the proclamation the shares of the total imports of such petroleum and fuel oils entitled to a reduction in the rate of import tax are allocated among countries of export on the basis of the proportions of the total imports for consumption in the United States supplied during the first ten months of 1939, the latest period for which statistics are available. The following allocations of the tariff quota are set forth in the proclamation:

"United States of Venezuela, 71.9 percent; Kingdom of the Netherlands (including its overseas territory), 20.3 percent; Republic of Colombia, 4.0 percent; other foreign countries, 3.8 percent."

The tax on oil imported to the United States was imposed on June 21, 1932. Prior to that time both crude and products had been admitted free of duty. The rates established were two and one-half cents per gallon on gasoline, twenty-one cents per bbl. on crude, fuel oil and gas oil, four cents per gallon on lubricating oils and one cent per pound on paraffin and wax. By the trade agreement just concluded the rates on crude petroleum and fuel oil, including gas oil, will be halved on the five percent quota to which imports at the reduced rate are limited. By the terms of the treaty, imports of crude and fuel oil for ships' bunkers, which heretofore have been admitted free, are bound against the imposition of tax or duty.

Following the establishment of the excise tax on oil imports in 1932 shipments to the United States dropped off roundly fifty percent. The accompanying table gives United States imports over the past ten years, and shows the decline which set in after 1932.

U. S. Imports of Petroleum

(Thousands of U. S. Barrels)

	Crude	Refined (all products)	Total
1929	78,933	29,777	108,710
1930	62,129	43,489	105,618
1931	47,250	38,837	86,087
1932	44,700	28,812	74,512
1933	31,924	13,501	45,425
1934	35,771	14,936	50,707
1935	32,344	20,437	52,781
1936	32,957	25,460	58,417
1937	27,311	33,037	60,348
1938	26,051	27,835	53,886
1939(7 mos.)	19,338	15,980	35,318

Including imports in bond for re-export or bunkering.

Before the United States imposed a tax on oil entering the country, Venezuela supplied about 45 percent of the total imports of crude. Since the tax was established, however, imports from other countries have been small and such oil as has come in has been drawn largely from Venezuela, this being due to the suitability of Venezuelan crudes to meet special requirements of the trade in the Atlantic seaboard states.

The following table gives imports from Venezuela to the United States during the past ten years. All but a few thousand barrels of these consisted of crude. Fuel oil imports, while originating from Venezuelan crude, come mostly from the Netherlands West Indies. The figures include oil imported in bond for processing and re-export as well as that for consumption within the country.

U. S. Imports from Venezuela

(Thousands of U. S. Barrels)

1929	34,431
1930	25,365
1931	21,142
1932	25,693
1933	17,295
1934	25,304
1935	24,597
1936	28,489
1937	23,187
1938	23,567

Includes imports in bond for re-export or bunkering.

As is well known, the United States outranks all other countries in the production and consumption of petroleum and is the largest exporter with the exception of Venezuela itself. While it has imported oil in considerable quantities for special purposes as already noted its exports, even during the depths of depression, have greatly exceeded its imports. An accompanying table gives statistics of United States exports during the past decade.

U. S. Exports of Petroleum

(Thousands of U. S. Barrels)

	Crude	Refined (all products)	Total
1929	26,401	136,719	163,120
1930	23,705	132,794	156,499
1931	26,535	98,859	124,394
1932	27,393	75,882	103,275
1933	36,584	70,143	106,727
1934	41,127	78,380	129,507
1935	51,378	70,774	122,152
1936	50,313	71,404	121,714
1937	67,127	93,464	160,591
1938	77,271	102,108	179,379
1939(7 mos.)	42,245	60,408	102,653

Since the Venezuelan crude which formerly came to the United States for refining now has established direct outlets to European and other markets it is not anticipated that any great increase in shipments to the United States will follow the reduction in duty under the reciprocal trade agreement. As noted

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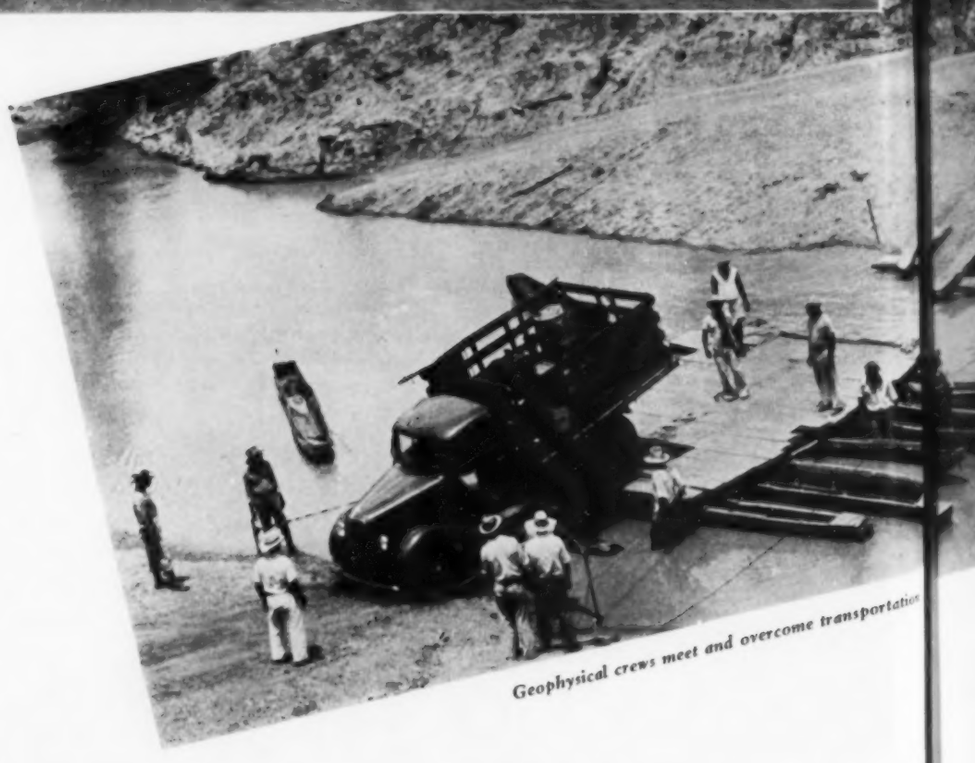
International News Photos

Principals in the negoitation of the reciprocal trade treaty: left, U. S. Secretary of State Hull, and below, Venezuelan Minister of Foreign Affairs, Dr. Gil Borges.

Pictures Inc.

GEOPHYSICAL METHODS



Geophysical crews meet and overcome transportation

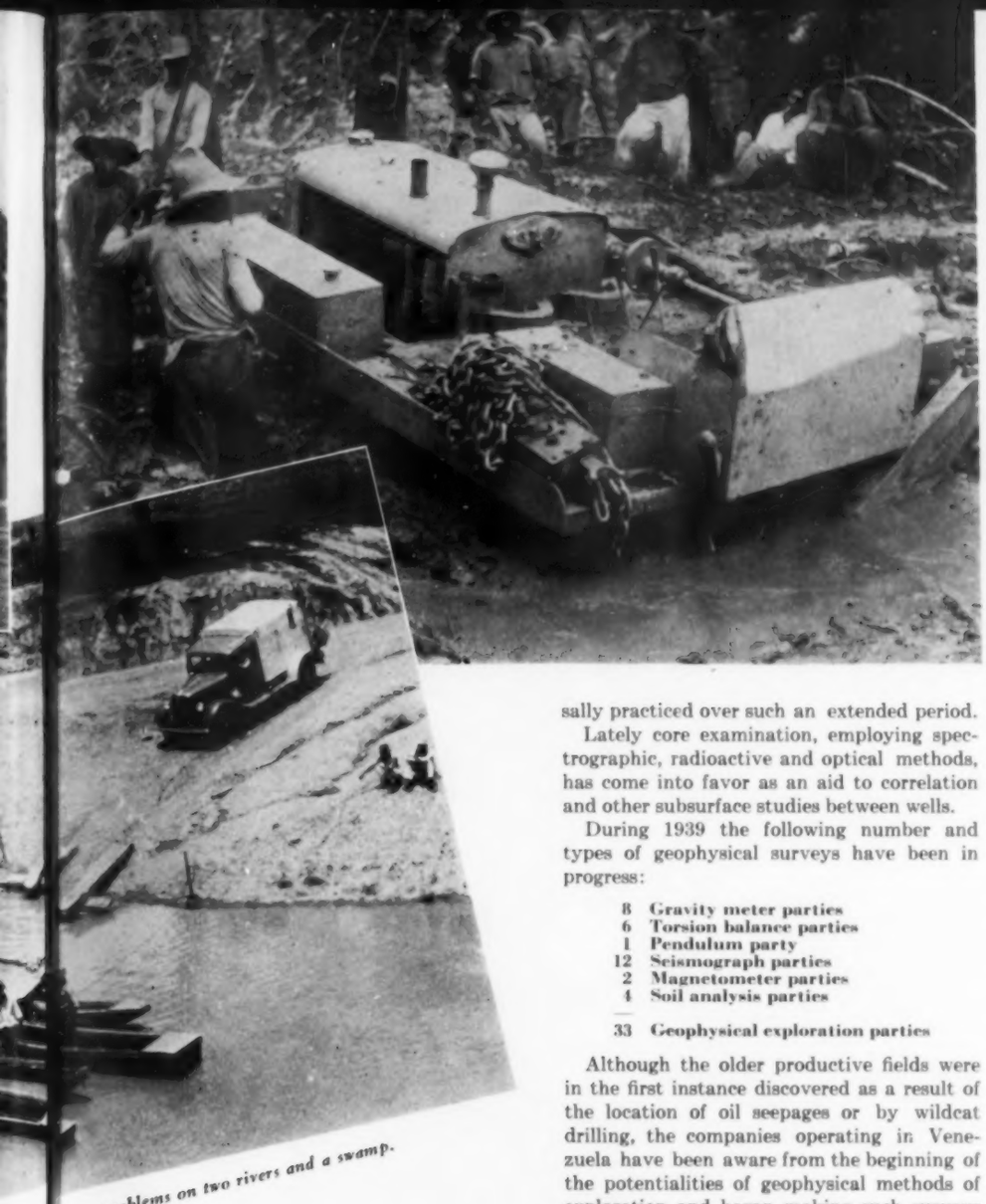
Terrain in Eastern Venezuela Well Adapted to Modern Systems of Exploration—Maturin Basin More Completely Covered by Surveys Than Any Other Geological Area—Transportation Difficulties.

GEOPHYSICAL exploration in Venezuela has been carried out with an initial impetus much greater than in most major oil producing countries. The principal geophysical methods in use today had already reached a high degree of development when intensive exploration was initiated in Venezuela. Three-quarters of the possible producing area of the country is covered by young deposits which either mask or reflect very weakly the underlying structural deformation and some type of geophysical data is absolutely necessary to define the subsurface structural conditions in this vast area.

Torsion balance and magnetometer methods are especially adaptable and have yielded satisfactory results as a general rule. The rather flat country immediately surrounding the Maracaibo lake and the flat featureless savannas of Eastern Venezuela offered almost ideal conditions for this type of geophysical survey. Seismic surveys during the early stages of development were not as successful as the gravitational methods. In most of the early seismic surveying the older refraction methods were relied upon to define the regional characteristics of the subsurface formations, rather than using seismic surveys as a tool to obtain detailed structural information.

Geophysical exploration began in the Maracaibo area (Western Venezuela) in 1924 with a short electrical resistivity survey and has been carried on with continuous acceleration to the present time. In Eastern Venezuela geophysical exploration was begun in 1927 with torsion balance, magnetic, and seismic surveys, and has been carried on much more intensively, up to the present time, than the work in Western Venezuela. There is probably no other geologic basin in the world as completely covered by so many different regional geophysical surveys as the Maturin basin of Eastern Venezuela.

In Venezuela gravitational surveys have been made with several types of torsion balances and gravity meters, and at least one type of pendulum apparatus. Practically all the magnetic surveys have been carried out with vertical intensity instruments, although



problems on two rivers and a swamp.

on a few surveys the horizontal intensity magnetometer was also employed in an endeavor to obtain quantitative interpretation of depth over structures. Gravity meters, torsion balances, and pendulums have been used on reconnaissance surveys. The magnetometers, while essentially reconnaissance instruments, are being used for detail surveys by two parties now operating in Venezuela. With the development of continuous profile, multiple recorder, and compositing techniques the reflection seismograph has proved to be a very satisfactory method for detail work. Experiments in soil-gas analysis are now being carried out which, if satisfactory, will add further information to the geophysical picture.

Electrical exploration methods have never been employed extensively. Resistivity methods have been tried on several short surveys, while more recently the electric transient (Eltran) method was given trial on specific structural problems. Electric well logging, on the other hand, came into early favor and there exist few regions as large as Venezuela where electric well logging has been so universally practiced over such an extended period.

Lately core examination, employing spectrographic, radioactive and optical methods, has come into favor as an aid to correlation and other subsurface studies between wells.

During 1939 the following number and types of geophysical surveys have been in progress:

8	**Gravity meter parties**
6	**Torsion balance parties**
1	**Pendulum party**
12	**Seismograph parties**
2	**Magnetometer parties**
4	**Soil analysis parties**
33	**Geophysical exploration parties**

Although the older productive fields were in the first instance discovered as a result of the location of oil seepages or by wildcat drilling, the companies operating in Venezuela have been aware from the beginning of the potentialities of geophysical methods of exploration and began making such surveys some fifteen years ago.

Since that time the concessions held by the V. O. C., Caribbean Petroleum Co. and Colon Development Co. have been closely investigated by gravity methods, both in the vicinity of existing fields and in outlying areas, and in latter years the seismograph has also been widely employed. The gravimetric methods used have comprised various types of torsion balances and gravimeters, among which may be included Thyssen, Holweck and Bamberg instruments. Both reflection and refraction methods have been employed in the seismograph surveys.

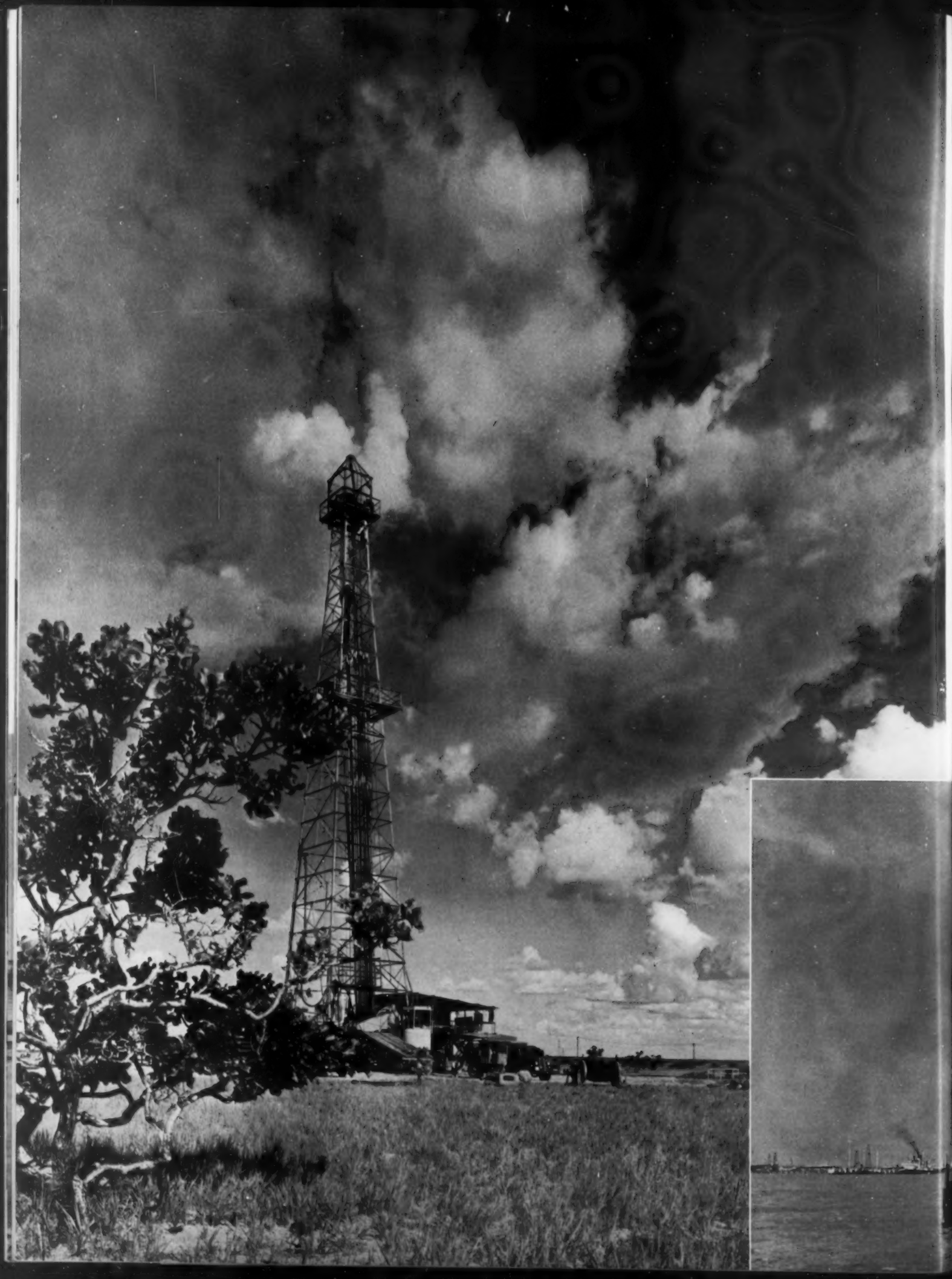
All the gravimetric surveys, made by companies affiliated with The Royal Dutch Shell group together with a proportion of the seismic work, have been carried out by geophysicists and other personnel in the direct employ of the companies. The remainder of the seismograph surveys have been carried out by parties engaged under contract from well-known surveying companies in the United States.

Nearly all geophysical methods and seismic methods in particular, unlike geological exploration, require considerable equipment and personnel, the transportation of which present a very serious problem in Venezuela. Anyone conducting a geophysical survey in Venezuela must be prepared to combat transportation difficulties through a rainy season which usually lasts six months and during which 100 or more inches of rain will fall. During this time swollen rivers and streams must be crossed. Roads on the Savannas which are passable during the rainy season may become impassable during the dry season because of deep, loose sand. The delta of the Orinoco River, consists of enormous swamps and marshes, except for the narrow natural levees which border the numerous tributaries of the Orinoco. Launches and house boats can be used on the large streams, but on the smaller streams and across the marsh area, a party chief must use all his ingenuity to carry on his survey and transport the necessary equipment. Locally made dug-out canoes are usually poled, paddled or dragged through the smaller streams and swamp areas. When automotive transportation becomes impossible the geophysical crews resort to boat, pack animal or foot methods, but whatever method has to be used the surveys are carried on with surprisingly good progress.

The large open savannas of Eastern Venezuela, once they are reached, offer ideal terrain for geophysical exploration. They are covered with sand or sandy soil which makes local transportation very simple and the vegetation is so sparse that surveys may be carried out with great ease and efficiency.

The difficult terrain, notably in the Colon area, where wide areas of swamp render transportation extremely difficult, and often impossible without great expense, has handicapped work of this nature, while in addition in certain areas the strongly-faulted nature of the strata and the presence of thick gravel beds have added to the difficulties. Nevertheless, the results obtained have fully justified the time and money expended and a large amount of valuable structural information has been obtained by these methods.

The science of geophysics has played a very important part in the rapid development of the Venezuelan oilfields and the future development will be intimately associated with developments in geophysical exploration methods. The oil industry in Venezuela had its inception about the time geophysics became an integral part of oil exploration. This exploration in Venezuela has not reached the complicated and exacting stage now so prevalent over what remains of the possible productive territory of the United States. In Venezuela many comparatively simple structural features are yet to be discovered, so that regional exploration programs by gravitational and magnetic methods will well repay their cost in discovery of prominent structural anomalies. Advanced technique and instrument development in seismic and gravimetric exploration, make these methods the logical ones to detail the most favorable of the anomalies discovered on the reconnaissance surveys. The discovery of future oil deposits in Venezuela as in all other countries, will be accelerated by the proper application of the method best suited to the problem.



PRODUCING FIELDS
of the World's Greatest Oil Exporter

The World's Second Largest Crude Oil Producer has a Future in the East as well as a Past and Present in the West. Size and Completeness of Operations Make Venezuela Unique Among Oil Producing Nations.

ON AN historic afternoon 440 years ago a stately Spanish ship, having wound its way through a narrow, twisted channel came in view of the great arm of the sea known today as Lake Maracaibo. The following day one of the richest countries in South America received its name from the commander of the expedition, Alonso Ojeda. Having seen the Indian villages on stilts in the lake, Don Alonso was reminded of another city built over the sea, and christened the country Venezuela—"Little Venice."

Today the Lake in which Alonso Ojeda found himself that afternoon of 1499 washes over one of the largest and most prolific oilfields in the world, a never ending stream of tankers conveys millions of tons of oil out of the lake to the markets of the world, and on its shores a great industrial development has grown up.

In the years that followed its discovery, Venezuela built up her historical background of idealism and violence, of a growing spirit of nationalism flourishing under an oppressive administration as a colony of Spain. Centuries passed before this national consciousness found its highest expression in the lofty ideals of Simon Bolivar, whose extraordinary military genius made him the liberator of seven nations.

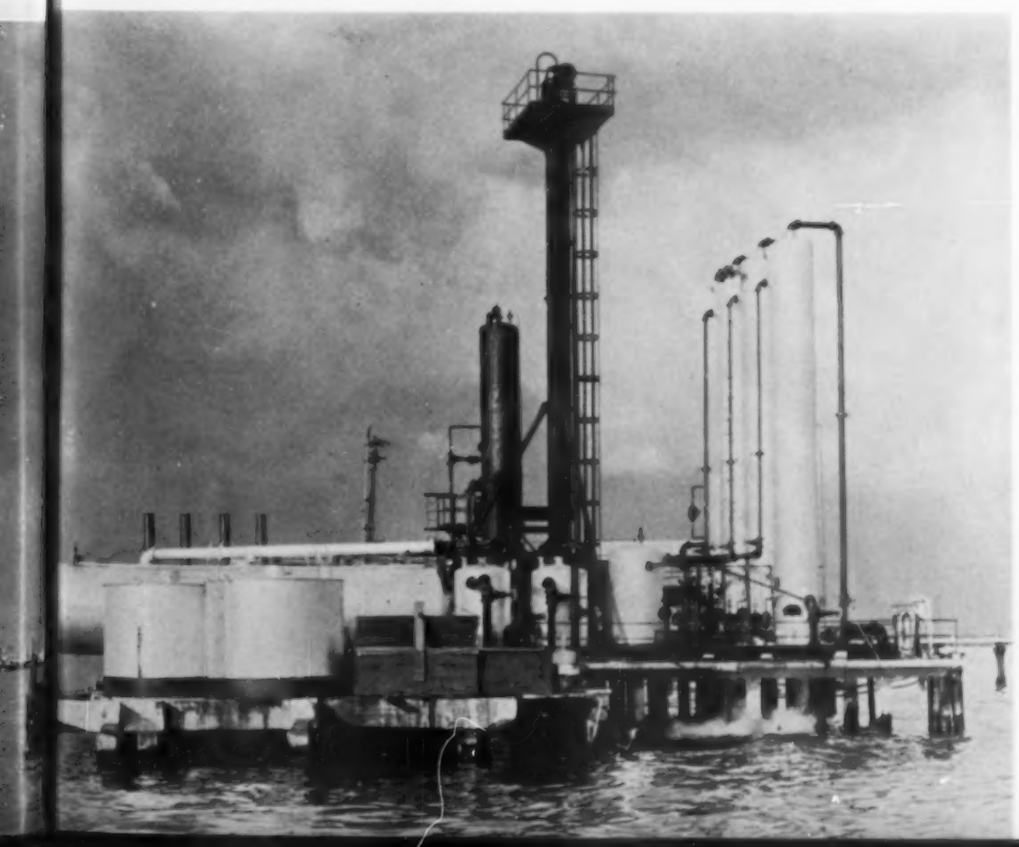
The huge reservoir of oil lay dormant under the keels of men-of-war and the marching feet of troops until 1883 when the oil history of Venezuela had its beginnings. In that year the Compania Petroleo del Tachira, having obtained a small concession near San Cristobal in the southwest, began producing oil from hand dug pits adjacent to an ancient seepage.

The real beginning of the Venezuelan oil industry was delayed for another 30 years although some exploratory work was done in that period. Finally in October 1914 the Royal Dutch-Shell interests brought in Zumaya No. 1 (now MG 8) for 2,650 bbl. per day on property acquired from the General Asphalt Company. Around this initial discovery has grown up the Mene Grande field where 393 wells have been drilled, from which 200,000,000 bbl. of oil have been produced and from which even now 30,000 bbl. per day are being shipped.

Actually, however, it required something spectacular to turn the attention of the world's great oil companies to the steaming lake basin of this South American republic, and in 1922 another Shell company, Venezuelan Oil Concessions, Ltd. supplied the necessary indication of the vast oil wealth of this area. V. O. C.'s Barroso No. 2 blew in for a production of 50,000 to 100,000 bbl. per day at La Rosa on the shore of Lake Maracaibo. Producing out of control the well only lasted for nine days after which it sanded up and was lost, but it was the signal for intensive development and the implications of its spectacular performance fired the imagination of oil men thousands of miles away.

The years 1914 to 1923 provided a period when several factors combined under the most favorable circumstances to encourage the sound and rapid development of the oil resources of Venezuela, oil resources whose potentialities even today are just beginning to be realized. The world war had stimulated the demand for petroleum to a tremendous extent. Mexico had furnished a testing ground for the perfection of a technique of large scale tropical operations; but the restrictive and uncooperative attitude that was to culminate 18 years later in the seizure of oil properties by the Mexican Government was just beginning to make itself felt. Oil companies were anxious to find a country where a sounder and more stable attitude prevailed. And Venezuela, under the administration of General Juan Vincente Gomez enjoyed the guidance of a shrewd and able negotiator, if not perhaps the political freedom indispensable to the democratic people of that country. General Gomez fully appreciated the importance of the large aggregations of capital and extensive technical skill possessed by the international oil companies; but he did not underrate the value of the subsoil riches of his country. He encouraged development by these companies but he exacted a fair share of the oil riches for the nation. And today Venezuela is in the soundest financial condition of any country in the world.

General Juan Vincente Gomez was elected president of Venezuela in 1908 and again in 1914 and in 1920. From 1907 to his death in 1935, however, General Gomez had a profound influence on the affairs of the nation and was responsible for the laws governing the granting of concession-contracts during that period. Large tracts were granted and development flourished under the oil law which had been liberalized by the regulatory decrees of 1918 and 1922. At that time, parcels of 10,000 hectares were granted for exploration periods. Not more than 300,000 hectares could be granted to a single company for exploration. The exploration period terminated at the end of three years after which half the acreage had to be returned to the



Left, Drilling well in M. G. O. C's Oficina field, and below Lago's No. 3 gasoline plant off shore from La Salina.

national reserve and an exploitation contract was granted for a period of 40 years. Royalties ranged from 10 percent down to 7½ percent for oil produced 150 miles from the sea and to five percent on lands covered by water.

During the period from 1929 to 1934 no further concessions were granted. Thereafter higher royalties, higher taxes and larger initial payments were required with the result that there was a noticeable concentration of activity in proven areas. Some concessions were applied for and granted during this period, but following the passage of the petroleum law of 1938, there was an almost complete cessation of concession transfer from Government to oil companies. This law imposed more severe restrictions on those who obtained new concessions than any regulations previously undertaken by the Venezuelan government. It has been suggested, however, that the 1938 law will be subject to modification when the government has had time to investigate more fully the areas that it may grant to applicants for new concessions.

Venezuela stretches some 800 miles east and west and runs 600 miles south into the continent. It has an area of 352,143 sq. miles, slightly less than the Republic of Colombia which borders it on the west and southwest. On the south, below the great Orinoco River, Venezuela is bordered by Brazil and to the southeast lie the Guianas. The whole northern shore is washed by the Caribbean. The population of Venezuela according to the census of 1936 was 3,467,494. There are some 589 miles of railroad and 5,883 miles of highway over which 16,500 automobiles operate.

The oil regions fall into three main divisons: the western fields shipping through Lake Maracaibo; Cumarebo, in the west but piping its oil directly to the sea; and the eastern

Right, fitting a 12¼ in. rock bit for San Joaquin No. 5, and below, Pumping well in the Quiriquire section with the camp just visible in the background.

region which is just now entering an area of intensive development. In June, 1939, there were 2,945 wells producing in the entire country; of these 1,051 were flowing naturally, 1,682 were pumping, and 212 were on gas or air lift. Altogether, 4,629 wells had been drilled since 1914 and 1,784,078,019 bbl. of oil had been produced since the initial discovery. The daily average production in June was 553,231 bbl. and the best estimate of daily average potential production placed this figure at 690,440 bbl. Forty-five rigs were in operation and the average initial production was just over 400 bbl. per day. The principal oil companies now operating in Venezuela and the official crude oil production figures and exports by years are shown in the accompanying tables.

Official Crude Oil Production and Export Figures for Venezuela (Metric Tons)

Year	Production	Exports
1917	18,248,524	8,650,760
1918	48,306,000	22,201,343
1919	45,913,840	2,168,443
1920	69,538,971	0,000,000
1921	218,146,326	151,158,071
1922	334,922,905	274,765,515
1923	639,257,476	504,053,465
1924	1,334,871,356	1,205,694,914
1925	2,884,486,615	2,680,273,325
1926	5,207,450,313	4,786,594,507
1927	8,733,236,011	8,235,686,737
1928	15,319,442,436	84,546,815,722
1929	19,844,936,248	19,051,400,726
1930	20,073,961,200	19,955,791,503
1931	17,191,872,770	16,466,341,830
1932	17,095,333,911	16,171,633,243
1933	17,293,193,373	16,586,650,385
1934	20,112,114,880	19,226,342,459
1935	21,990,373,417	20,522,097,902
1936	22,945,299,300	22,327,162,087
1937	27,733,926,228	25,083,834,722
1938	28,071,370,376	26,645,921,227

Principal Oil Companies Operating in Venezuela (June 1939)

Lago Petroleum Corporation
Venezuelan Oil Concessions Limited
Caribbean Petroleum Company
Colon Development Company Limited
Mene Grande Oil Company, C. A.
Central Area Exploitation Company (Venezuela) Limited
Standard Oil Company of Venezuela
Texas Petroleum Company
Venezuelan Oil Development Company Limited.
Socony Vacuum Oil Company, C. A.
Guarico Oilfields (Venezuela) Limited
Compania Anonima Inversiones de Valle Grande
Caracas Petroleum Company

While primarily a crude exporting country Venezuela has three refineries which ran 1,130,556 bbl. to stills in June and there were in storage at the end of that month 6,450,371 bbl. of crude. Domestic consumption, while small is growing, and in the last full year for which statistics are available some 342,315 tons of products were consumed as indicated in the accompanying table for 1938.

Oil Consumption in Venezuela 1938

	Metric Tons
Gasoline and Naphtha	123,528
Kerosene	9,137
Lubricants	1,133
Gas Oil and Diesel Oil	24,113
Fuel Oil	159,145
Other	25,259
Total	342,315

The scale of operations, particularly in the lake fields is tremendous. It has been estimated that well over $500,000,000 has been invested in these fields alone exclusive of Cumarebo, and all of eastern Venezuela. Headquarters for the three principal companies operating around the lake are at the city of Maracaibo on the west side and near the head of the lake. Here the Lago Petroleum Corp. (Jersey Standard) Caribbean Petroleum Company, Venezuelan Oil Concessions, Ltd., and Colon Development Co., Ltd., (Royal Dutch Shell Group) and Mene Grande Oil Co. C. A. (Gulf) have their offices. Today it is possible to place a car on the ferry at Maracaibo and be across the lake in an hour, rolling down the road which connects all the fields from La Rosa to Mene Grande. While originally the fields bordering on the eastern side of the Lake were considered separate, today the theory is that from La Rosa to Bachaquero is one huge field. If this theory is correct it is easily the largest field in the world from the point of view of actual and potential production. When development of this field had been carried on for some time and while drilling was still confined to the shore and foreshore, it was found that productive areas were divided from each other by dry stretches along the lake shore. Subsequent deep lake drilling by Lago, however, established the fact that the oil bearing sands did not disappear but swung out into the lake and then turned inshore again. Lake drilling has now connected up most of the Bolivar Coastal fields although some work remains to be done in establishing the connection between Lagunillas and Bachaquero.

In addition to a large number of barges, launches and tugs for transportation up and down the lake, the Shell Group, the Jersey Standard Companies and Gulf maintain fleets of lake tankers. The Shell Group's fleet consists of 32 tankers with an total capacity of 506,700 bbl., Lago has 19 vessels with an aggregate capacity of 298,500 bbl., and Gulf's fleet consists of 13 lake tankers of 227,800 bbl. total capacity.

The Lake Maracaibo Basin has always been unsuited to agriculture or other forms of local development, and the advent of the oil industry, therefore, found the region devoid of roads. For this reason, it has been necessary for the oil companies to build virtually all the roads required for their operations.

In the early days transportation to the fields was effected by water, and this method is still relied upon to a considerable extent. The companies operate a number of tugs and

Steam plant of M. G. O. C with V. O. C. pumping derrick seen from the village of Lagunillas.

towing launches to handle a fleet of barges, which carry materials from Maracaibo to the fields. The majority of new equipment received from abroad is shipped direct to the major Lake fields, where there are material wharves. From there the materials are transported to the warehouses, storeyards and fields by means of trucks, a large fleet of which is maintained by the companies.

The exceptions to this method of transportation from the shipping terminals are the Mene Grande and Colon District oilfields. In the case of the former the material is transported over the 15 km. to the field by means of a narrow gauge railway from San Lorenzo, and in the Colon District the materials are barged up the Catatumbo river to Encontrados and from there taken to the fields via a section of the Tachira railroad, and the C. D. C.'s own narrow gauge railway.

The fields on the Eastern shores of Lake Maracaibo are linked and traversed by a system of roads, which have been built by the companies, and with the aid of the latest type of road making machinery, they are kept in good condition, so that easy access may always be available to all the areas under development. The construction of these roads has been handicapped by the swampy terrain which many of them traverse and by the absence of stone, which has to be quarried in the island of Toas near the entrance to Lake Maracaibo and brought to the fields in barges.

This road system connects with a new car-carrying and passenger ferry, which has recently been put into operation, plying between Maracaibo and the eastern shore. It is owned by a private Venezuelan company. It is now a comparatively easy ride from Maracaibo straight through the oilfields to Bachaquero, and this facility for the rapid and easy transport of personnel and light freight has brought about a great improvement in conditions. In 1940 the opening by the Shell Group of the Bachaquero-Mene Grande road will mean that all the oilfields on the eastern side of the Lake will then be completely served by an oil companies' road system, which, of course, will be available to the public. This road will also link up with the Mene Grande-Mototan highway, mentioned elsewhere.

The Shell Group operates three aeroplanes, the primary object of which is to maintain rapid communication between Maracaibo, from where oilfield development is controlled, and the fields, particularly more remote areas such as the Colon District, Tachira and Eastern Venezuela. Landing fields have been made at Lagunillas, Bachaquero, La Paloma (Colon District) and at certain places in Central and Eastern Venezuela. Mene Grande Oil Co. operates a Ford tri-motor and Lago and Standard of Venezuela have several planes. Socony-Vacuum has recently flown a light plane to La Guaira to facilitate travel from Caracas to the company's drilling operations in Eastern Venezuela.

In view of the insufficiency of public utility communications in the oilfield area, a system of telephone and wireless communication has been built up by the oil companies in order to keep Maracaibo in touch with all fields.

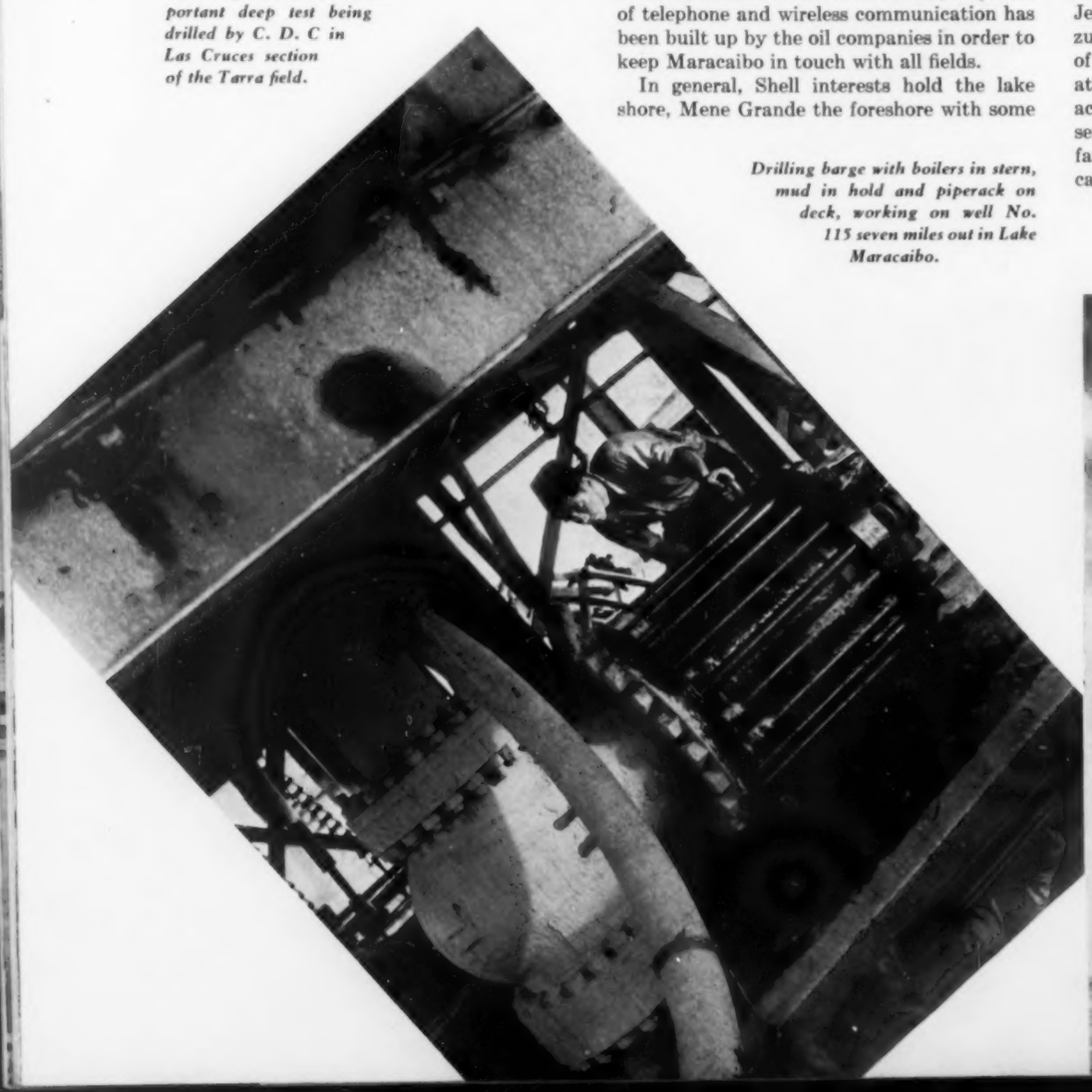
In general, Shell interests hold the lake shore, Mene Grande the foreshore with some wells on land and others in shallow water, while Lago's operations are confined to the lake bottom, necessitating some very interesting work in off-shore drilling. The outstanding characteristics of all three companies is the completeness of their operations; each company maintains its own power station and high tension lines, labor camps, schools, clubs and recreational facilities. They cooperated in the construction and maintenance of a huge dyke to hold back the waters of the lake from flooding the Lagunillas area which has subsided some eight or ten feet below the surface of the lake. Huge warehouses and tank farms may be seen along the shore serving an industry that is many miles from the nearest oilfield equipment supply depot. Extraordinarily complete machine shops and sawmills are supplemented by marine yards capable of repairing and even building sizable vessels.

Driving down the east side of the lake over a good public road built and maintained by the oil companies, the first section of this great field is Ambrosio where Lago, Mene Grande and Venezuelan Oil Concessions have produced a total of 27,116,757 bbl. to June 1939. The daily rate of production is now 2,874 bbl. and some 80 wells are producing. No drilling is going on at present. Mene Grande maintains here a 165,000 bbl. capacity tank farm.

Just south of Ambrosio is La Rosa where Venezuelan oil got its real start as a significant addition to the world's petroleum industry. Here the same four companies plus another Jersey Standard company, Standard of Venezuela, have produced to date 290,991,448 bbl. of oil. The four companies are now producing at the rate of 43,048 bbl. per day from 701 active wells. Only one rig is maintained in service and that one belongs to V. O. C. Tank farms of the three companies have a total capacity of 1,033,704 bbl.

Near La Rosa is Cabimas with regional

Blowout preventor on an important deep test being drilled by C. D. C in Las Cruces section of the Tarra field.



Drilling barge with boilers in stern, mud in hold and piperack on deck, working on well No. 115 seven miles out in Lake Maracaibo.

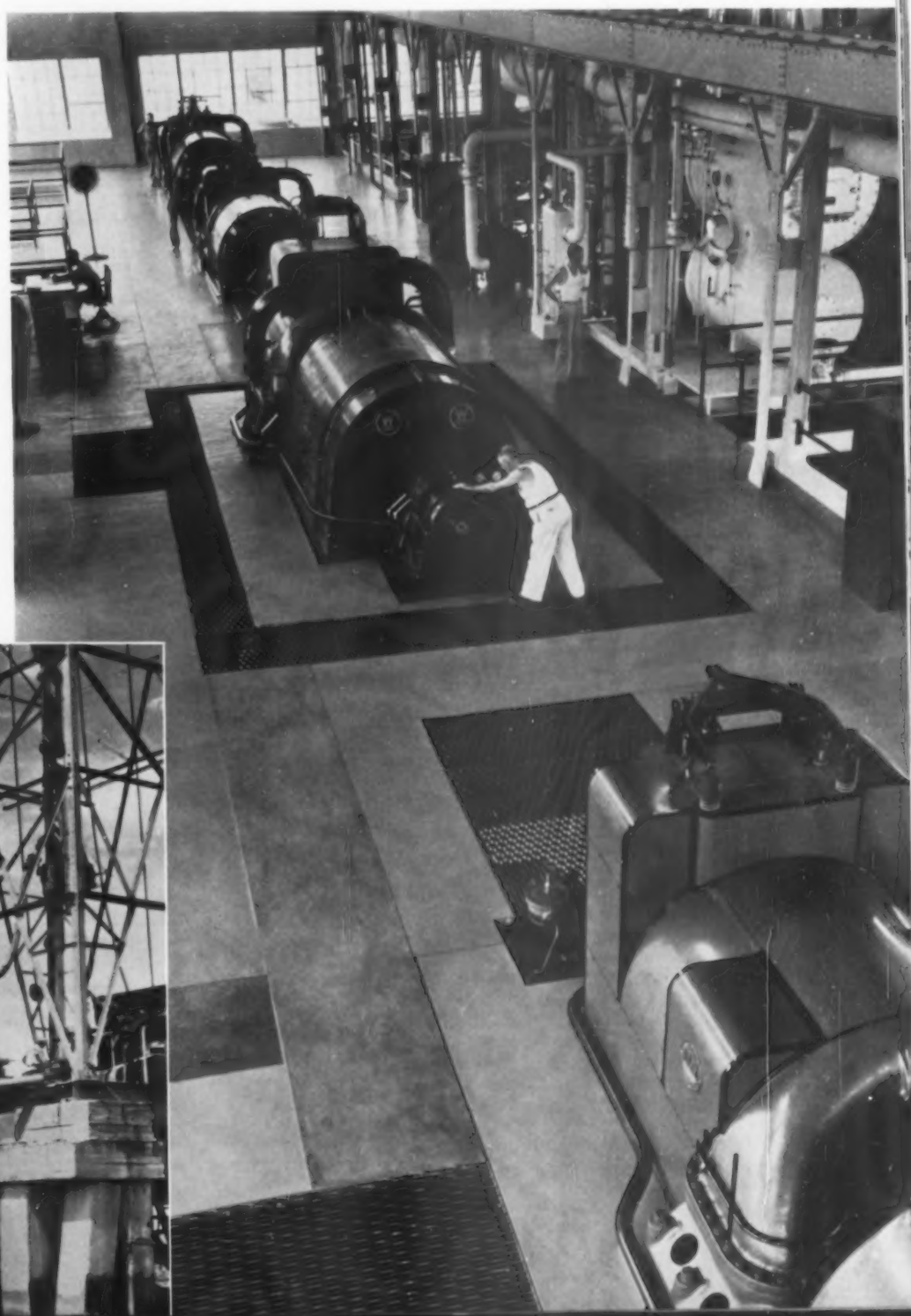
headquarters for Shell and Mene Grande. Here too is the La Salina camp of Lago Petroleum Corp. At La Salina the company maintains a marine yard where the two largest all-welded dumb barges in the world were constructed. The peculiar requirements of off shore drilling are met here. In the cement casting yard giant monoliths are built from steel reinforced concrete, sometimes 133 ft. in length and weighing up to 40 tons. They are picked up by a 50-ton travelling crane, deposited on a barge and conveyed to a proposed drilling location. A 50-ton derrick-arm crane mounted on the barge up-ends the piles and sets them in the mud at the bottom of the lake. Weight is added to the top until they are firmly fixed in the mud, three piles to a corner of the derrick floor. A platform of 36-in. I-beams covered with roughened steel decking is placed on top, a derrick erected, a drilling barge equipped with four boilers, mud pit in the hold and piperack on deck is anchored along side; flexible hose connections are secured and drilling begins. It is interesting to note that the company is experimenting with three foot diameter caissons to replace the piles for deep water foundations. These consist of 5/16 in. steel tubes about three feet in diameter and only 10 to 12 ft. long. The steel tubes are flanged at either end and they can be bolted together. The steel tubes are covered with reinforced concrete. These caissons are fastened into 90 ft. sections and set one to a corner of the derrick floor.

South of La Rosa is Punta Benitez where Lago, Standard of Venezuela, Mene Grande and Venezuelan Oil Concessions have produced 34,971,808 bbl. to date, now have 124 wells producing 19,468 bbl. per day. Three strings of tools are in operation and steel storage capacity amounts to 1,082,755 bbl.

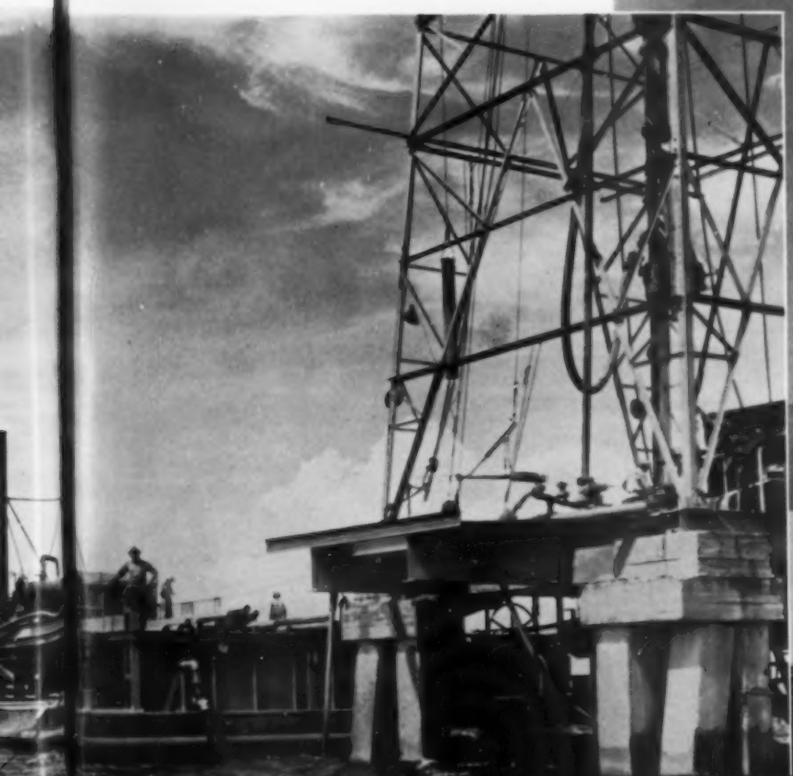
Continuing down the lake road one finds Tia Juana, responsible for 94,803,459 bbl. to date, now producing 126,395 bbl. per day from 438 active wells. Two wells were spudded here in June. Combined tank farms have a capacity of 789,169 bbl. Lago, Mene Grande and V. O. C. operate in Tia Juana.

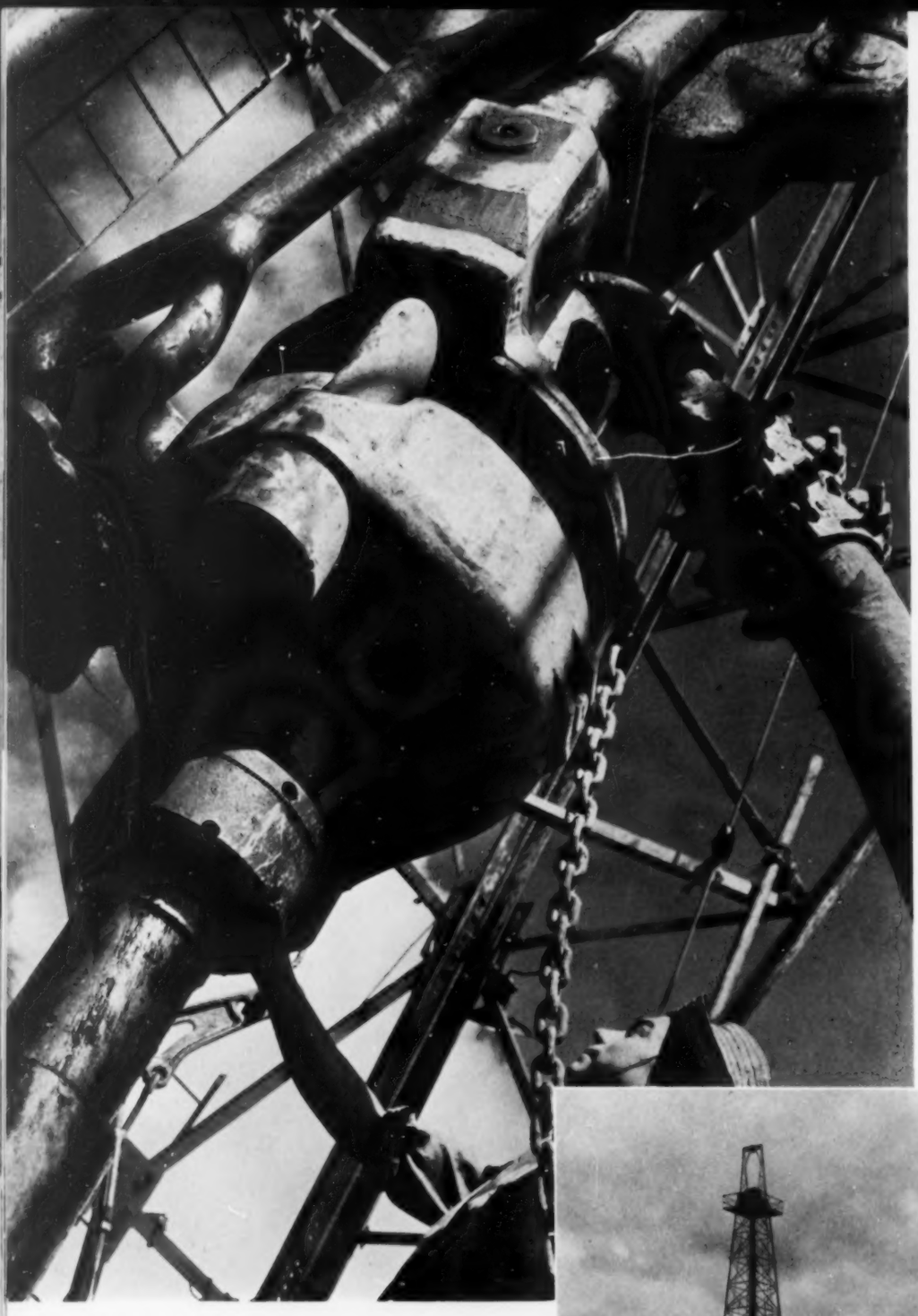
Finally Lagunillas, greatest section of this astonishing field, is reached where the same three companies plus Standard of Venezuela have produced 854, 186,645 bbl. to date and are now producing from 1,098 active wells at the rate of 203,719 bbl. per day or just over 50 percent of the total daily average of the Bolivar Coastal fields. Lagunillas, in fact, produces 36 percent of the entire daily average output of all Venezuela. Nine strings of tools are in operation in this field which includes one drilling well out in the lake. Storage is available for 1,833,835 bbl.

Bachaquero is the last developed section of this field and promises to be more active in 1940 than it is at present. It appears likely that Mene Grande and Lago will start active drilling campaigns here next year. Only 28 wells are now producing and of these 25 belong to V. O. C. and three to M. G. O. C. To date 3,102,007 bbl. have come from V. O. C. wells. Venezuelan Oil Concessions is the only company now producing and that company turns out 8,567 bbl. per day and has 175,564 bbl. of storage capacity available.



Two 5000 kw. and two 2500 kw. turbo generators in M. G. O. C's power plant at Las Marochas.



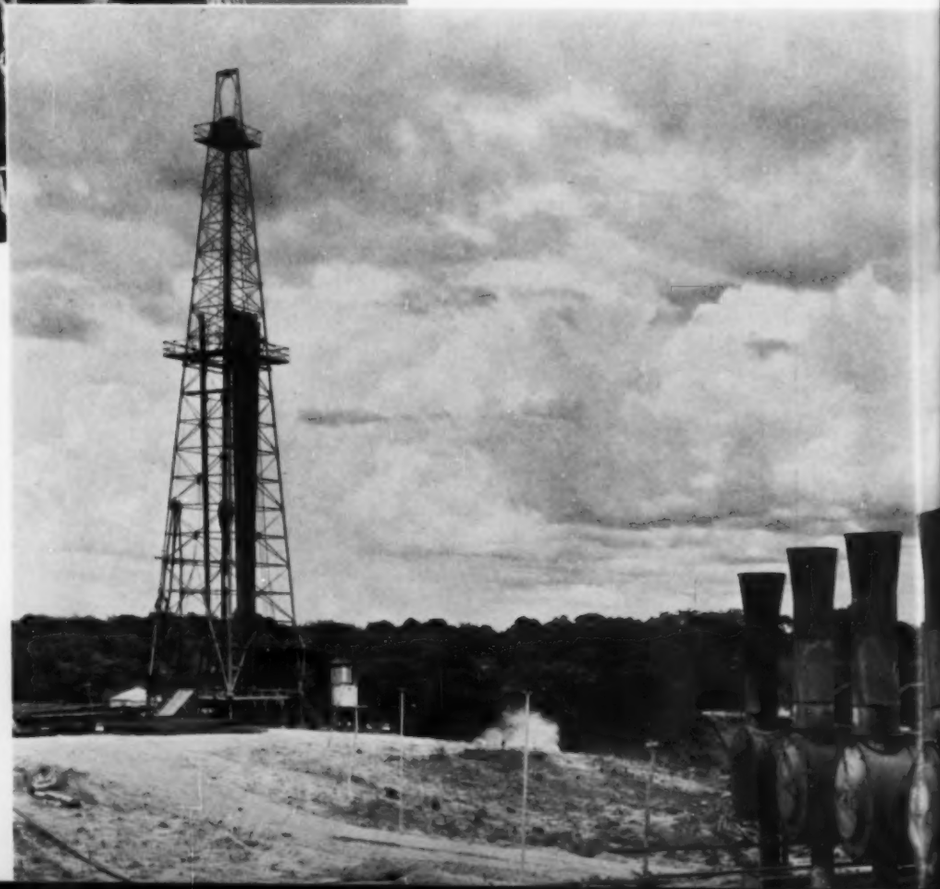


duction in this area, has produced to date 484,133,858 bbl. of oil and is now producing at the rate of 155,347 bbl. per day. Lago and Standard of Venezuela together have produced 574,921,442 bbl. from discovery to date and now have a production of 185,885 bbl. per day. Mene Grande Oil Company's total production amounts to 246,116,824 bbl. and its present daily rate is 62,839 bbl. Of Lago's June production 67 percent resulted from natural flow, the balance being produced by air or gas lift or pumping. Over 90 percent of Standard of Venezuela's June production came from pumping wells while M. G. O. C. produced 32 percent of its oil in June by natural flow and 68 percent by the pump. Forty percent of Venezuelan Oil Concessions June production came from naturally flowing wells, only two percent from gas or air lift and 58 percent from pumping wells.

The wells along the lake produce from unconsolidated sand formations with the average depth being 2,100 ft. in the La Rosa area, ranging from 2,200 to 5,000 ft. in Lagunillas and 2,400 ft. at Tia Juana. Oil in the La Rosa area is about 23 deg. A. P. I. In Lagunilas the crude has a considerable water content and in the case of V. O. C. it is necessary to dehydrate the wet crude electrically.

One of the characteristics of Shell's Mene Grande field is that it produces crudes of different gravities, namely, 17 deg., 19 deg. and 28 deg A. P. I. These crudes are produced from two different formations; the heavier is the more important, giving 85 percent of the

Left, swivel on M. G. O. C's well No. 29 in Oficina; below, Standard of Venezuela's San Joaquin No. 5 with four 125 h.p. boilers and 136 ft. derrick; Right, Schlumberger truck in Eastern Venezuela.



No drilling is now going on in Bachaquero field.

South from Bachaquero and 15 km. inland from the Lake is Venezuela's oldest commercial field, Mene Grande, operated by Shell's Caribbean Petroleum Company and producing at the rate of 30,861 bbl. per day from 257 wells. Five rigs are now active and altogether 203,399,088 bbl. have been produced. Capacity is available for storage of 818,147 bbl. but the field connects with the San Lorenzo refinery where further crude storage tanks are located.

To summarize the situation by companies in the Bolivar Coastal fields, Venezuelan Oil Concessions, responsible for the initial pro-

field's total output and is productive over the whole of the proven area, the wells varying in depth from 1,500 ft. to 5,000 ft.

The lighter crude is produced from an older horizon, which consists of sandstones intercalated with thin beds of shale, and the wells producing from this horizon average about 2,000 ft. in depth. Although the wells in this horizon are more prolific than those producing the heavy crude, the light production has so far been developed only in three comparatively small areas in the field.

At Mene Grande the crude output suffers to a varying degree from water contamination and is subjected to chemical dehydration in the field. Although the field has probably passed its peak, there is considerable scope for further development, both in present proven areas and in their lateral extension.

The crude oil is pumped through two eight-inch lines to San Lorenzo, 17 km. distant on the shore of Lake Maracaibo, where it is either treated in the local refinery or exported.

A gas plant installed in 1928 in this field operates on the compression and cooling principle. The greater part of the high pressure residue gas is utilized for gaslift purposes in the field and the balance for fuel at the San Lorenzo refinery and loading terminal. In order to produce a gasoline of the required specification, it is passed through a stabilizer plant and from the tail gases of this plant propane is separated and liquefied under pressure. This propane is sold in cylinders on the Venezuelan domestic market under the name of Shellane.

Considerably further inland and east of La Rosa is the El Mene field operated by British Controlled Oilfields which has produced to date 24,069,281 bbl. is now producing from 75 wells at the daily average rate of 1,199 bbl. and is doing no drilling at present. The entire output is sold to Caribbean Petroleum Company. In the same section is the Hombre Pintado field operated by the same company and producing 1,674 bbl. per day from nine wells. Altogether Hombre Pintado has produced 554,625 bbl. These are the only producing operations of B. C. O., but the company is now engaged in drilling a wildcat in this general area.

On the west side of the Lake, Shell through V. O. C. operates Concepcion and La Paz fields which together have produced 25,742,-059 bbl. and are now producing from 119 wells at the rate of 4,318 bbl. per day. In the Colon district, southwest of the Lake near the Colombian border, through the Colon Development Co., Shell has produced 53,301,818 bbl. from the Tarra and Los Manueles fields. These two fields are now producing at the rate of 15,418 bbl. per day from 71 active wells. Three rigs are in operation in this section, one of them No. T 98 in Las Cruces section of Tarra prepared to go to 10,000 ft. in an effort to find the sands that are producing across the border in the Barco Concession. In addition to these rigs C. D. C. is drilling a wildcat, San Miguel No. 1, almost on the border and only four kilometers from Petrolea on the Barco. The headquarters for these Shell operations is Casigua whence a pipeline carries the oil to the mouth of the Escalante River at Salito near the southern end of the lake.

The structural conditions in these fields are extremely complex, which causes each well to be an individual problem and precludes any system of cheap routine development. Production was first developed in the Tarra field in 1916, and although a number of wells were drilled in this neighborhood in subsequent years, an indication of the physical difficulties to be overcome is provided by the fact that it was not until January 1930 that regular production and export of oil could be commenced. The quality of the oil produced from Tarra and Los Manueles ranges from 22 deg. to 31 deg. A. P. I. The production is obtained from a number of sandstones or sand bodies, broken up by faults, and in some cases subject to water drive. At Las Cruces the majority of the wells are on the pump. Most of the production has an appreciable water content and dehydration is effected by chemical methods.

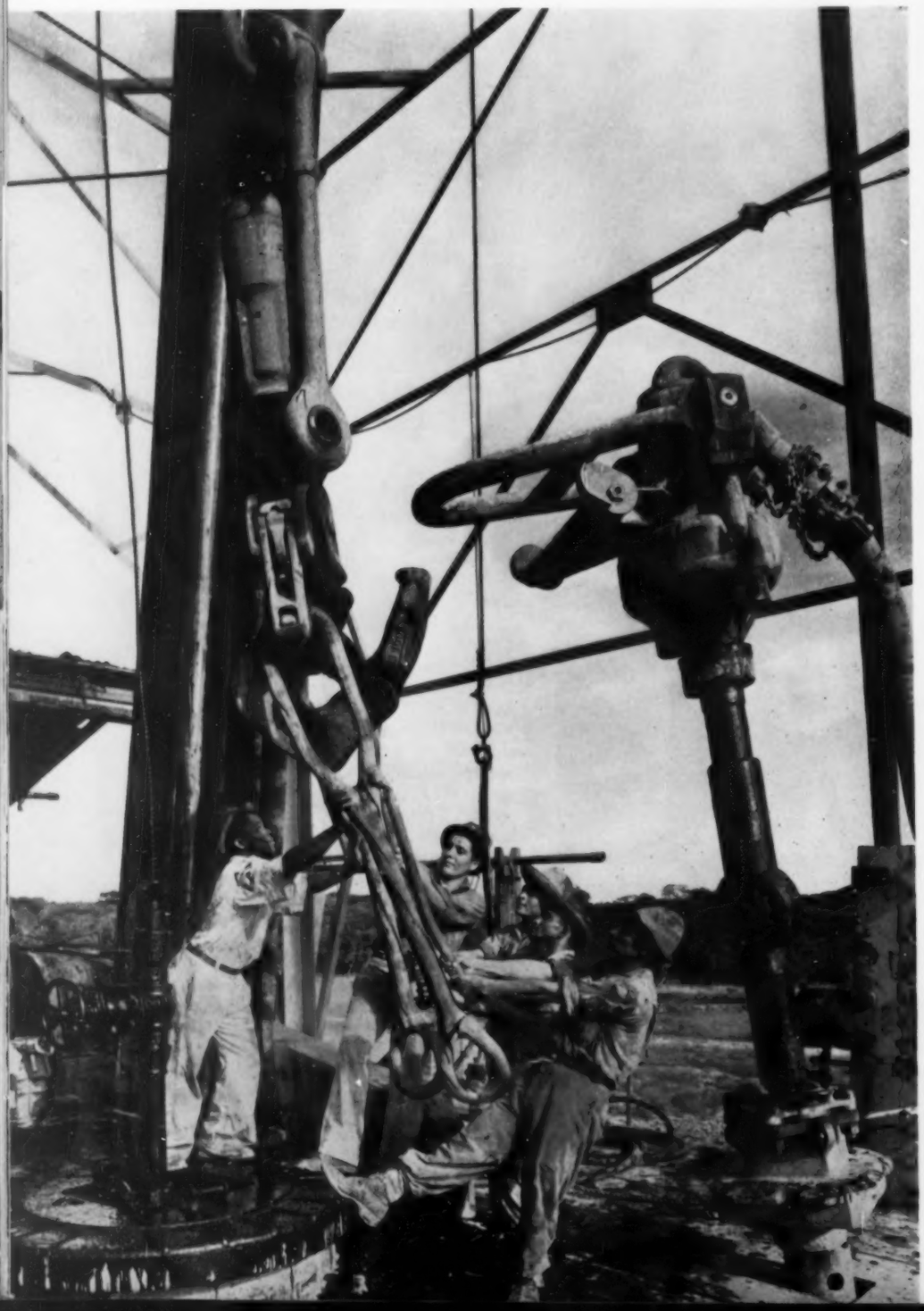
In the past four wells have been drilled on the Oro structure, situated in the extreme westerly corner of this concession. Although these wells obtained small production, there appeared no prospect of developing sufficiently substantial quantities to justify the laying of a pipeline from such a remote locality. Operations at Oro were accordingly discontinued in 1927. More recently two deep exploration wells were drilled at Rosario, situated approximately midway between Tarra and Oro, but with negative results.

Leaving the fields that ship through the Lake, for the east, Pan American Airways stops at Coro whence a road leads a few kilometers to Cumarebo on the Caribbean. In some respects this is the ideal field, producing 5,650 bbl. of light oil per day, which flows by gravity to a marine loading station in the sea. There are 77 active wells and no drilling is being done at present. Storage for 72,400 bbl. is available.

Back to Coro and once again on the Pan American plane one passes La Guaira, the port for Caracas, Guanta adjacent to Puerto La Cruz, the recently opened terminal for Mene Grande's 16 in. pipeline from Oficina, and alights at Caripito, headquarters for Standard of Venezuela's operations in the East. Quiriquire is the important field here, producing 72,466 bbl. per day from 273 wells. One string of tools is in operation. To date the field has produced 136,970,585 bbl. since discovery in 1923, being the first field discovered in Eastern Venezuela. Standard of Venezuela also operates the Temblador field which has produced 3,857,914 bbl. and the costly Pedernales field which has accounted for 4,391,604 bbl. Drilling operations which were carried on from barges with Diesel-electric power have been suspended but Pedernales produces 4,936 bbl. per day from 13 wells. Temblador produces 10,566 bbl. per day from 66 wells and four rigs are in operation here.

At the moment the most interesting field in Eastern Venezuela is Oficina which has just entered the class of shipping fields on December 5 of this year when the 160 km. 16 in. pipeline was completed to Puerto La Cruz. Port, pipeline and field are operated by Mene Grande and it is estimated that over $30,000,000 was invested by the company before oil began to flow toward the sea. The present drilling program calls for six strings of tools and there are now 20 wells producing at the rate of about 31,000 bbl. per day. Storage is available at Oficina for 390,000 bbl. and at Pto. La Cruz the tank farm will accommodate 946,000 bbl.

Swinging hook and elevators into position on Socony-Vacuum's Carrizal No. 1 in Eastern Venezuela.



Other fields in eastern Venezuela are Santa Ana where one producer is responsible for 18,470 bbl. to date (1,936 bbl. in June) and where two rigs are in operation. Three rigs are in operation at San Joaquin just off the Oficina–Pto. La Cruz road and two producers there are now shut in waiting on connections. Further drilling is being done at El Roble.

Socony-Vacuum is active in the east having drilled Quata Nos. 1 and 2, and San Diego No. 1 and Iguana Nos. 1 and 2. Wildcats Carrizal No. 1 and Altamira No. 1 shown on the accompanying map, are now drilling. Caracas Petroleum Company, an Alfred Myer concern, has drilled in this section and Guarico Oilfields Ltd., are now drilling south east of Caracas. The Texas Company has also drilled two wells in eastern Venezuela and is likely to become considerably more active during the next year or two.

Summarizing the operations of the three principal companies for all of Venezuela, it is found that the Shell Group has produced the largest total quantity, some 766,576,823 bbl. as of June 30, 1939, followed by the Jersey Standard companies with a total production of 738,144,173 bbl. and Gulf with a total production of 246,116,824 bbl. At present Standard leads in daily average production with 279,758 bbl., Shell has 205,944 bbl. and Gulf produced at the rate of 62,839 bbl. per day in June before the Oficina field was in full operation. Oficina may add 30,000 bbl. more per day to Gulf's Venezuelan production.

Altogether Lago and Standard of Venezuela have 582 flowing wells, 75 on gas or air lift and 340 pumping wells. Some 275 of their wells are closed in at present. Shell has 334 flowing wells, 55 on gas lift, 836 pumpers and 306 potentially active wells closed in. Gulf, excluding the new Oficina field, has 89 flowing and 438 pumping wells with 29 closed in. Standard has drilled 1,512 wells, Shell 1,961, and Gulf 694. During June of this year Venezuelan Standard and Lago ran 375,450 bbl. of crude to stills, Shell refined 702,762 bbl. and Gulf ran 52,344 bbl. of crude to stills.

While the fields around Lake Maracaibo are responsible for over 80 percent of Venezuela's production and operations in this section are on a tremendous scale, most active development work is being carried on in the eastern areas in contrast to the more settled production in the lake basin.

Maracaibo Geology

THE geological history and structure of the Maracaibo basin is perhaps better known than that of any other Venezuelan oil district, although much still remains to be learned.

In the broad sense this basin is bounded to

the north by the Manantiales-Toas uplift, on the west by the Perija range, on the south by the Merida range and on the east approximately by a divide provided by high mountains of Tertiary rocks. The total area is about 63,000 sq. km., of which about 12,755 sq. km. is occupied by Lake Maracaibo and surrounding low lands.

The Maracaibo basin is part of a large geosyncline, from which it was detached during Tertiary time by tectonic developments; these movements have produced a somewhat complicated geological framework, particularly in the marginal areas.

The Basin can be divided into a northern third and a southern two-thirds; the first comprises most of the Districts of Maracaibo, Mara, Miranda and Bolivar. This portion is characterized by a relatively thin overburden of young clastic material lying over folded structures of the older Tertiary formations lying near the surface; most of the middle and upper Tertiary formations are absent in this region or are developed as thin terrestrial deposits. In regional terms it is a structurally high area, characterized by peneplanation at middle to end of Tertiary.

The southern two-thirds of the Basin includes the larger and deeper portion of Lake Maracaibo and the low lands to the east, south and west. Geologically it was a relatively low structure throughout the Tertiary period; from Miocene to Recent time its history is marked by probably continuous subsidence due to loading by clastic sediments, especially in the south Eocene. Sediments deposited in shallow sea water are thick and widespread. In middle Tertiary time open marine conditions prevailed for a comparatively short time interval.

In general, the oil pools of the Maracaibo basin are found in (1) closed reservoirs on anticlines or domes of considerable variety, the age of productive formations ranging from Cretaceous to Middle Miocene; (2) gently monoclinal reservoirs of porous sandstone lensing out up-dip against old shorelines and (3), in reservoirs that are structurally a combination of (1) and (2). Shore line accumulations of type (2) are responsible for most of the oil produced at present in the Maracaibo Basin. These productive shore lines are, however, not on the margins of the basin as previously defined but are close to the central portion of the topographical depression of the Basin as it exists today. These old geological shore lines are the result of different arrangements of deeps or troughs and of arches or barriers. No commercial oil fields have been developed on the margins of the Basin, with the possible exception of Mene de Mauroa (Buchivacoa) toward the eastern edge where the geological age of the structure is not clearly defined.

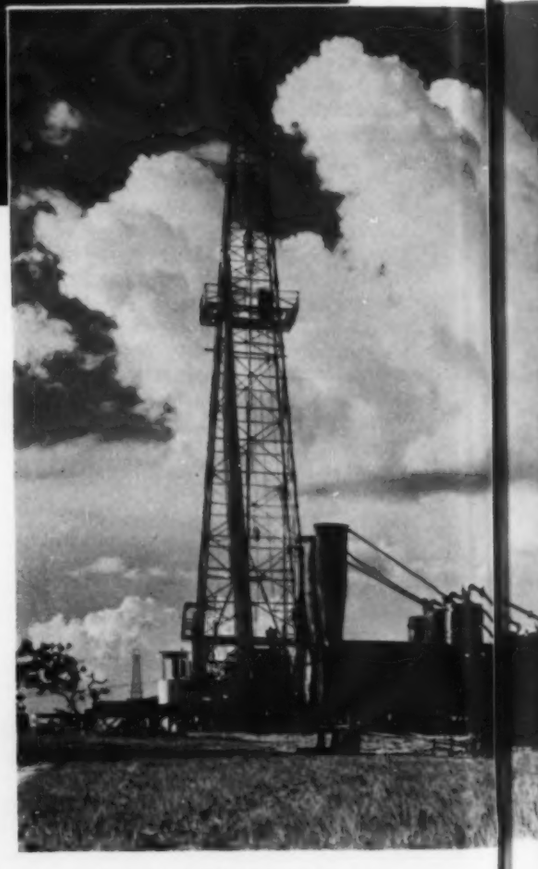
The most prolific oil fields are found on the border between the northern and southern portions of the Basin as defined above; in other words, between the areas that were characterized by stable conditions through most of the Tertiary period on the one side and the areas that were affected by practically continuous subsidence. Here shoreline accumulation and concentration of oil were aided by structural conditions. The Mene Grande field has been ascribed to this class (C. Wiedenmayer). The fields in the western part of the Colon District belong to a marginal area or a shelf in the basement rocks where oil accumulation is governed by anticlinal folding.

Repairing the propeller on a Diesel tug, one of Lago's fleet of 119 small boats for lake use.

The outline of land and sea areas and sedimentation conditions in the middle Miocene were much different from what they were in Oligocene time. The lower Miocene was even more unsettled and transitional than in the Oligocene, Epiorgenetic movements caused a substantial shifting of seas. More stable and open water conditions prevailed in the middle Miocene but in general Miocene sediments of the Maracaibo Basin are Clastics.

In the Pliocene the distribution of land sea is remarkable similar to the present day conditions; most of the Pliocene sediments are of the fluviatile and piedmont deltaic types. In many cases there is a marked angular unconformity between Miocene and Pliocene indicating crustal movements at the end of the Miocene.

Newer and heavier equipment is used in the more recently developed fields in Eastern Venezuela.



The equipment in both pictures above is in Gulf's Oficina field.

Drilling Technique

Lake Drilling Eight Miles off Shore in West, Remoteness of Operations in East, Comprise Principal Unique Conditions in Venezuelan Operations.

THOSE oil fields of Venezuela, included under the general designation of "The Lake Maracaibo Fields," which are located along the eastern edge of Lake Maracaibo in the political subdivision District of Bolivar are locally known as the "Bolivar Coastal Fields." This group of fields, consisting of Ambrosio, La Rosa, Punta Benitez, Tia Juana, Lagunillas and Bachaquero, are so situated that over one half of the producing area lies under the waters of Lake Maracaibo. By the end of July, 1939, a total of 2,986 wells had been drilled in these fields, of which total 1,669 were drilled in the Lake.

Development of water operations to their present extent and degree of efficiency has been the result of constant study and improvement, beginning with crude shore-line adaptions of conventional land structures to special marine foundations, in 60 ft. of water and located as far as eight miles from shore. Water operations have been aided considerably by relatively quiet water conditions and the absence of any appreciable amount of tide. Original Lake development began, naturally enough, along the shore line and extended lakeward as practical and economic means were developed to permit operations in the deeper water, the major obstacle being the development of Lake structures for well foundations, tank battery platforms, and the other structures required in the normal operation of a producing property.

The original shore line well foundations were either large concrete corners or timber cribbing, supporting the derrick by means of a wood substructure. For drilling these wells, suitable foundations were necessarily required for supporting boiler stations, slush tanks, pipe racks, etc., and for which there was no immediate need after the wells were completed. The next step in the development of the Lake operations was the use of creosoted wood pile foundations. This type of foundation has proved satisfactory in shallower water where piles not exceeding 65 ft. in length are required. The majority of wells drilled on this type of foundation also included additional piling support (which was later pulled) for pipe racks, slush pumps and tanks. Boiler stations were located so as to drill the greatest number of wells from one location, after which the boiler platform was used for a tank platform, tool rack, etc. Steam lines were laid on small trestle struc-

tures, called burro walks, which were later used for carrying flow and other lease lines. To avoid the building of expensive boiler station platforms, boilers were first mounted on small barges which were sunk wherever possible to avoid the rocking of the barge by wave action. It is interesting to note that the Gulf Coast practice of sinking barges was employed in Venezuela several years before developed in the Gulf Coast area. The gradual lakeward movement of the operations progressed beyond the limits of economical use of creosoted piles and the use of concrete piles was adopted. Progressing through several designs of concrete structures, the present standard well foundation is built to withstand, with an ample factor of safety, the load limits of derricks erected on them. These foundations include 12 piles, driven three to a corner, with each corner having two plumb piles and one batter pile for sway bracing. These precast, monolithic, reinforced steel, concrete piles are built in required sizes up to 24 in. by 24 in. square by 133 ft. long, weighing approximately 40 tons each. The corner group of three piles is capped and into the caps is set a steel derrick base made up of 36 in. I-beams. Other Lake structures, such as tank battery platforms, absorption and compressor plant platforms, are all built on concrete piling.

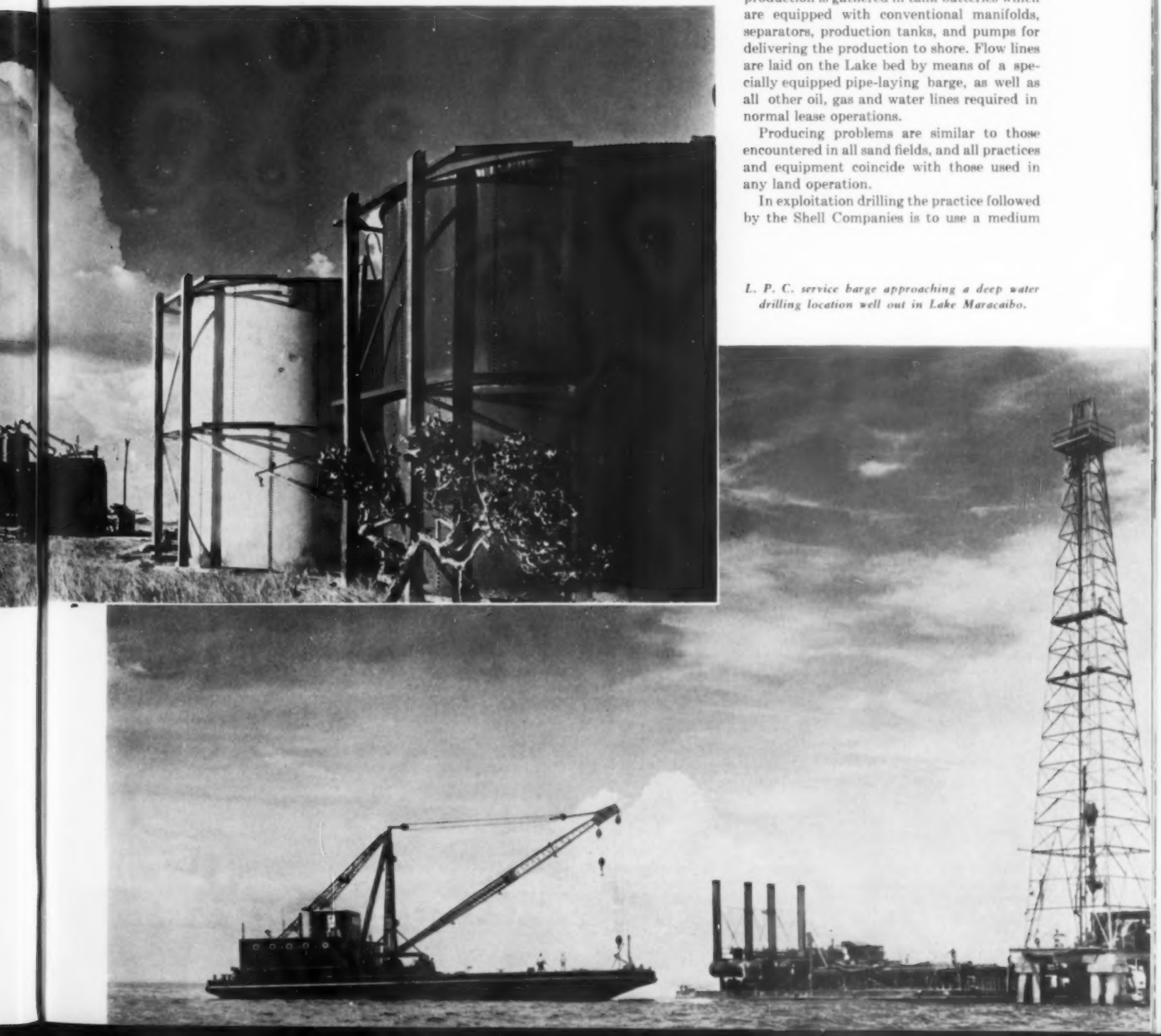
Since the cost of all Lake foundations varies directly with depth of water, the cost of erecting required pipe racks, slush tanks and boiler stations would become prohibitive in the more lakeward operations. To meet this condition, drilling barges were developed to take the place of the additional foundations. The barges, 48 ft. by 110 ft. by 8 ft. in size, are equipped with necessary boilers, and pumps, ditches, pipe racks and in fact everything required for drilling operations. Engine drawworks, rotary and blocks are erected on the well foundation. The barges are not tied to the well foundation, but are held in position by four anchors. The anchors are placed so as to hold the barge steadily in position during drilling operations, and also to permit pulling the barge away from the well foundation during storms or rough weather.

Under normal conditions wells are completed at an average depth of 3,000 ft. in 10 to 15 days.

Producing operations are basically similar to corresponding operations on land. Well production is gathered in tank batteries which are equipped with conventional manifolds, separators, production tanks, and pumps for delivering the production to shore. Flow lines are laid on the Lake bed by means of a specially equipped pipe-laying barge, as well as all other oil, gas and water lines required in normal lease operations.

Producing problems are similar to those encountered in all sand fields, and all practices and equipment coincide with those used in any land operation.

In exploitation drilling the practice followed by the Shell Companies is to use a medium



L. P. C. service barge approaching a deep water drilling location well out in Lake Maracaibo.

Hydromatic brake on one of the six drilling rigs operated by Mene Grande Oil Co. in the Oficina field.

duty steam outfit, consisting of a 12 by 12 in. drilling engine, rotary table of 20½ in. diameter, and unitized semi-enclosed drawworks. The slush pumps are 14 by 7¼ by 14 in., boilers 75 h.p. Loco type and cementing pumps 10 by 3 by 10 in.

For derrick requirements the 126-ft. extended leg type with a capacity of 246,000 lbs. is generally used. For drilling purposes these derricks are reinforced to 432,000 lbs. and are afterwards left stripped on the well to facilitate routine clean-out work and servicing.

Casing schemes vary considerably, but the 10¾–7–4¾ in. and the 13⅜ in–8⅝ in.–6⅝ in. schemes predominate. The oil sands in the areas where these schemes are used are of an unconsolidated nature and to control the influx of sand the liners are, generally speaking, made up of wire-wrapped screen pipe of a gauge varying between .010 and .015, or of casing slotted with apertures of .014 in. or .026 in. gauge.

In the harder eocene formations where sandstone predominates in the productive horizons wells are usually completed with a combination oil string perforated with round holes and cemented above the pay sands, or alternatively with a full oil string of blank pipe cemented solid and selectively gun perforated against the productive horizons.

It is the usual practice to drill to completion depth before making the water shut-off. In certain areas, however, where subsurface conditions are well-known, the surface string is sometimes dispensed with, and in such cases the water string is cemented before the oil zone is penetrated, the water shut-off point being determined by correlation.

Very little coring is done in exploitation work, reliance being placed on the Schlumberger electrical logging device. For measuring stratigraphical dip and deviation of the hole the Schlumberger dipmeter and teleclinometer, and also single shot instruments are run as required.

Striking progress has been made in recent years in the speed of completing the comparatively shallow exploitation wells, which are drilled in large numbers in the V. O. C.'s Bolivar District fields.

Whereas a few years ago such wells, averaging, say, 2,500 ft. in depth, required several weeks from spudding to bringing into production, they are now being completed in an average time of approximately one week. This improvement has been achieved, not only by the use of up-to-date equipment, but by the elimination of all time-consuming practices not strictly necessary for the safe completion of the wells and by highly-organized coordination between all the different phases of the operations. The greater part of the time required in the drilling of a well is, of course, still taken up by running tools and casing, cementing time and washing in, while the bit is actually on the bottom of the hole on average less than 24 hours per well.

The unconsolidated nature of the Younger Tertiary producing horizons gives rise to mechanical trouble through the incursion of sand into the wells, and, although such difficulties have been obviated to a great extent by the screening policy now in use, a large amount of repair work, involving the replacement of liners, has to be undertaken, particularly on the older wells.

In the majority of fields, this repair work, which involves sidetracking operations, is undertaken by a medium duty drilling outfit, but in the La Rosa area remedial work, owing to the shallow depth of the wells, can be carried out with a production hoist.

In many of the fields artificial lifting is necessary and pumping powers, individual pumping units and gas lift and gas-boiler methods are variously employed. As regards

(Continued on page 93)

ONE SURE WAY OF CUTTING PUMP COSTS

Keep slush pump maintenance costs down and a major drilling expense is under control. Every operator wants it, many demand it, and numerous means are employed. One **sure** way of doing it is pictured here . . . and it's the standard practice of hundreds of pump owners today. Here's what they're doing:

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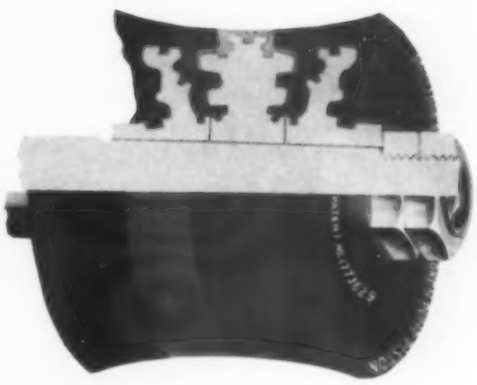

Above: Quarter-section view of OKEH Piston shows how rubber and steel are molded to form an integral unit.

Right: Quarter-section view of OKEH water end rod packing. . . . the original lip sealing rod saver.

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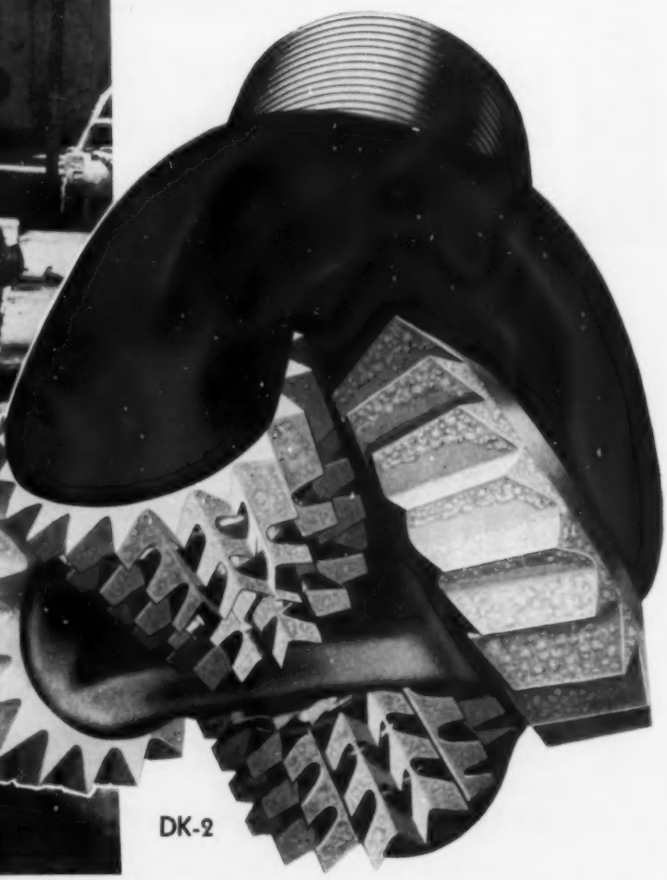

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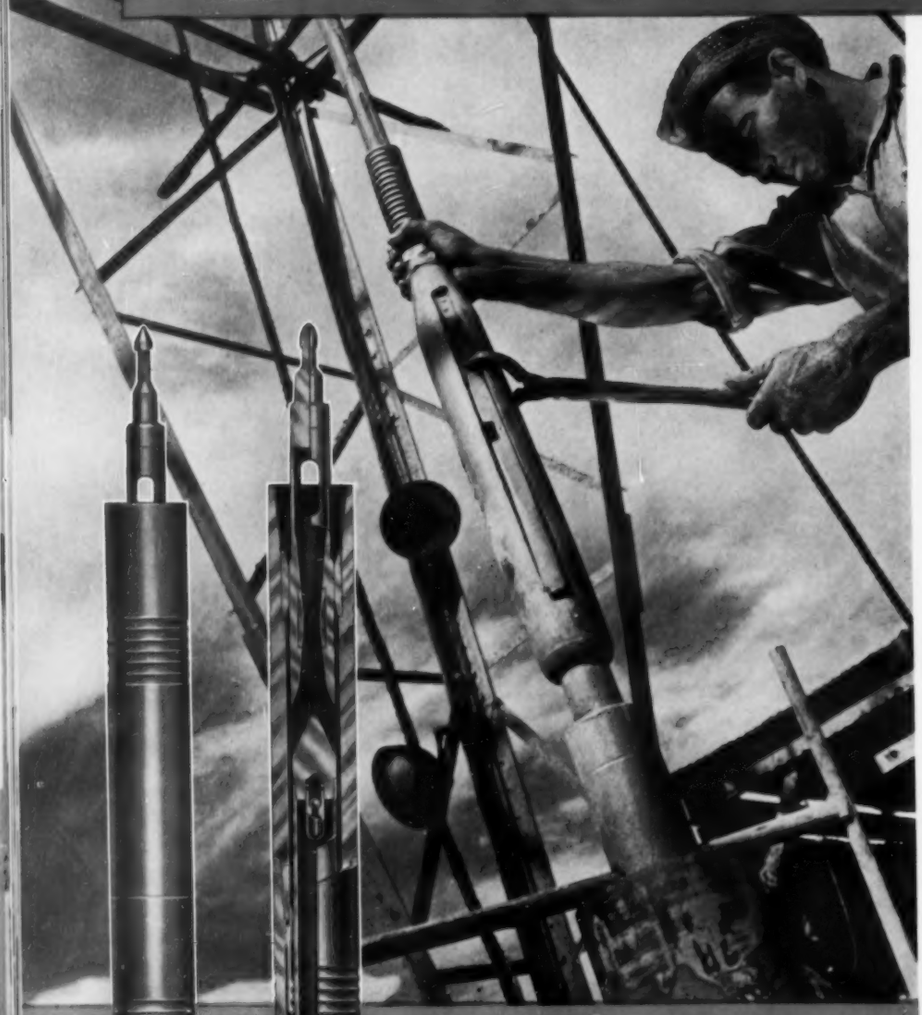
THE GEOLOGY of VENEZUELA

BJ Checked and Double Checked with ELLIOTT Wire Line CORE DRILLS



This Field Photograph from Venezuela Shows Operator Releasing Overshot from Inner Barrel
Hard Formation Core Catcher
Soft Formation Core Catcher
Exterior View with 4-Way Head
Sectional View Showing Location of Inner Barrel Valve
Arrows Indicate How Suction Is Exerted on Core by Means of Inner Barrel Valve
3-Way Soft Formation Cutter Head
Hard Formation Cutter Head

Operators far from the source of supply always have favored this simple-to-operate core drill, — and in every major field in Venezuela BJ Elliott Wire Line Core Drills are today taking accurate, informative cores at the lowest possible costs.

BJ ELLIOTT ADVANTAGES

Here are the features and the money-saving advantages which are yours when you operate a BJ Elliott Wire Line Core Drill . . .

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2. You can continue to drill without coring, or you can core continuously, or you can drill and core in any order and for any footage you desire, and at costs practically the same as for straight drilling;

3. You can reduce the number of round-trips to an absolute minimum, with definite savings in time and worthwhile savings on the drilling string and all surface equipment;

4. You can secure cores averaging more than 10 feet in length, from any formation; and all cores will be accurate, uncontaminated cross sections of the formation being drilled; and these cores can be removed easily from the barrel;

5. You can secure successful cores immediately, as no experience is needed to drill or core; native crews in over seas fields operate this core drill without difficulty;

6. You will obtain long, trouble-free service from each BJ Elliott Wire Line Core Drill, due to the simple design, which eliminates exact fits required in other types of wire line drills, and to the small number of moving or wearing parts, all of which are carefully made and amply strong to assure success of the complete assembly.

7. You are certain of profitable results from each BJ Elliott Wire Line Core Drill, and a continuing interest in your success and satisfaction. This Core Drill was developed by the Elliott Organization — Pioneers in Coring Equipment — and as improved by Byron Jackson Co., it is today the unquestioned Leader for taking better cores at the lowest costs.

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Above, last stages in the completion of the largest refinery in Venezuela at Caripito, and right, sand line coring in the Oficina field.

individual units the six foot stroke type is the predominating size. Hitherto the bulk of these units have been driven by 20 h.p. gas engines, but with the advent of electrification many of these units are being converted to electric drive.

Shell's deep exploration work has so far been carried out almost exclusively by heavy duty steam outfits consisting of a drilling engine 12 by 12 in. with dual drive, a rotary table of 27½ in. diameter and unitized drawworks with hydromatic brake. Boilers are 100 h.p., slush pumps 14½ by 7½ by 18 in. and cementing pumps 10 by 4 by 10 in. The derrick is 136 ft., with a capacity of 952,000 lbs.

The standard casing scheme employed for deep exploration drilling is 18⅝ in.–13⅜ in.–9⅝ in.–6⅝ in.–4¾ in. During the course of drilling adequate mechanical coring is carried out, supplemented by electrical logging. Dipmetor and deviation surveys are made as required and drill stem tests are carried out on promising formations.

A heavy duty Diesel outfit is being tested by Shell in exploitation drilling and has not yet been used on a deep exploration well. The rig consists of two 7¼ by 16 in. slush pumps and unitized drawworks with hydromatic brake. The cementing pumps are 4½ by 10 in. driven by two Diesel engines. The derrick is 136 ft. with a capacity of 645,000 lbs.

EASTERN VENEZUELA

The eastern region of Venezuela is a relatively undeveloped territory which varies in topography from mountainous and broken at the north to extremely flat lands toward the south and southeast. Roads are scarce in this region of the country and operations, especially those of an exploratory nature, meet unusual obstacles. In most cases long roads have to be built as a preliminary to any activity. In some instances, rivers can be used as a transportation route to localities near the place of operations. In all cases, transportation costs make up a substantial share of operating costs in Eastern Venezuela.

DRILLING PRACTICE

The drilling methods and equipment in use do not differ basically from those used in the Mid-Continent and Gulf Coast operations. Steam powered rigs are still in general use, although two Diesel rigs are at present being operated on exploration drilling and a Diesel electric rig is used for drilling at the Pedernales field.

Light to heavy rigs are in operation in accordance with the depth of the wells and character of the formations penetrated. Drilling engines are of the horizontal type, ranging in size from 10 by 10 in. to 14 by 14 in. Mud pumps of the 16 in., 18 in. and 20 in. sizes are used. Saturated steam, varying in pressure from 150 lbs. to 300 lbs. per sq. in. power the rigs. In general, all the drilling equipment used follows the standards of modern practice in the industry.

Complete unitization of rigs is adopted wherever possible. Drilling engines are unitized with their substructures; draw works are made into compact units; mud pumps are permanently mounted on wheeled wagons with all possible piping in place; cement houses are also mounted on wheeled wagons; feed water pumps and generators, with all their piping are made into skid units; engine sheds have been designed for transportability and ease of assembling; piping connections are so made as to be transportable in sections. Where the terrain permits, derricks are skidded between locations or moved on specially designed wheeled units while boilers are permanently mounted on skids.

The design of drilling strings has not presented special problems in Eastern Venezuela thus far. Drill pipe on the 6⅝ in. and smaller sizes, both with A. P. I. and full hole tool joints is used. Tool joint wear has been negligible up to the present time. Square Kellys are being used exclusively.

Non-directional, straight hole surveys are made at regular intervals on all wells. Considerable emphasis is placed on the verticality of wells, the permissible deviation depending, of course, on the total depth of the well.

Coring and electrical logging of the wells are extensively used in drilling operations. The use of wire line core barrels is confined to wildcat drilling. In production drilling, coring is limited to a minimum, as electric logs are relied upon for correlation purposes.

Drill stem testing is resorted to whenever convenient. The use of a subsurface pressure bomb in connection with drill stem testing is a common practice.

A. P. I. V-thread casing has been generally used thus far. The adoption of round-threaded casing is at present in progress. Casing programs for both shallow and deep drilling conform with standard practices in North America. Combination strings, separate liners and gun perforating of blank casing are being used in well completion.

A widely used cementing procedure has been adopted for Standard Oil of Venezuela's production drilling. A movable unit made of two 10 by 3½ by 10 in. and one 10 by 4½ by 10 in. pumps, water tank and manifold, and carrying its own hopper and mixing tank, performs the cementing operations. The mud pumps are generally used in wildcat areas for well cementing.

A supply of ground clay for making drilling mud is available from the Quiriquire brick plant for local usage. However, all weighing material is imported from North America. Both sodium tannate and sodium hexa-metaphosphate are used as viscosity reducing agents.

Drilling mud control is becoming an ever-increasing problem on account of the declining reservoir pressure in some fields which results in considerable difficulties being experienced in bringing the wells in through mudded-off sand faces. Pressure drilling is being looked upon as a possible solution of the problem.

In the majority of cases, the wells are tubed to bottom with 2½ in. EUE tubing. Utmost simplicity is aimed for in the design of Christmas trees. Use of single wing trees has been adopted wherever possible.

The drilling of twin wells in the Quiriquire field is of special interest. On account of the great thickness of the producing section of this field, it has been found advisable to drill two wells, approximately 33 ft. apart, on each location. This practice affords a very good control of gas and water production and is believed to facilitate the efficient operation of the field.

At the Quiriquire field, 39 wells are producing on the beam. On account of the uneven terrain central power installations cannot be used in this field. All wells are equipped with

Flame arresters atop one of the Mene Grande's loading tanks with the Puerto La Cruz harbor in background.

individual short stroke units, powered with gas engines up to 20 h. p. rating. The subsurface equipment follows the standards of modern pumping practice. Pumps of the fluid seal and liner types are used. Gas and mud anchors are of conventional design. The pumps are actuated by ¾ in. sucker rod strings. So far, no sucker rod trouble of any kind has been encountered. Periodical dynamoter tests are used for the control of pumping well performance.

In the Cumarebo field, 16 wells are being pumped; eight of them are operated by a central power unit, six are equipped with individual units and prime movers, and two are operated by back cranks.

Gas-lifting in Quiriquire and Cumarebo has not yet gone beyond the experimental stage.

The most interesting phase of the producing operations in Eastern Venezuela and Cumarebo is the control of producing rates from the engineering standpoint. Standard of Venezuela strives to produce wells and fields at rates that under the best existing knowledge will result in efficient utilization of reservoir energy. A close control is kept of subsurface pressures, flowing differentials, gas-oil ratios, expanding gas-caps and encroaching waters.

Taking five inch cores on Lago's No. 115 seven miles off shore in 120 ft. of water.

One of Socony-Vacuum's wildcats in Eastern Venezuela where that company has acquired concessions in a large area in the last few years.

Pressure maintenance projects have been adopted wherever possible. In the Cumarebo and Quiriquire fields, 50 percent and 20 percent respectively of the total gas produced is being returned to the formations. The pressure maintenance operations at Cumarebo have met with remarkable success as the reservoir pressure has declined very little since large scale maintenance operations were started.

The electrical dehydration of petroleum is generally used in Standard of Venezuela's operations. Two plants of three units each have been installed in Quiriquire and are successfully handling about 6,000 bbl. of wet oil per day. At Temblador where a serious dehydrating problem exists on account of the stability of the emulsion, an experimental combination chemical and electrical plant is being successfully used.

Drilling equipment being conveyed over Colon Development Company's narraw guage railroad leading to Casigua.

Exploration and Exploitation Drilling Carried on under Conditions That Vary Widely from U. S. Midcontinent Requiring Modification of Standard Practice. Mr. Brantly, President of Drilling and Exploration Co., Inc. Which at Present is Operating Thirty Rigs in Various Countries of North and South America, Discusses in the Accompanying Article Some of These Problems and the Types of Equipment Best Adapted to Overcome Them.

DRILLING Equipment
Selection Governed by Conditions

By J. E. Brantly

THE exploration for and the exploitation of the petroleum deposits of Venezuela require the employment of drilling equipment of varying character and capacity. There are arid regions in which fuel and water can only be obtained in adequate quantities at considerable expense. There are other properties being operated where water is adequate in both quantity and quality because of the more or less abundant rainfall. Between these two extremes of aridity and relatively simple transportation problems in so far as equipment is concerned and the regions of heavy rainfall where machinery and tools can only be moved at considerable expense and roads are costly, there are the various intermediate types of terrain and natural conditions.

The depth capacity of the various drilling equipments required likewise vary from shallow holes at 2,000 ft. or even less, to depths approaching 10,000 ft., and probably in the near future in excess of this depth. Hole size requirements likewise vary considerably from relatively larger bores in the heavy oil districts to smaller diameters in the light oil areas. Thus a study of the drilling equipment requirements of the country necessitates considerations of all types of conditions under which wells are drilled. Also there are organizations which have substantial numbers of drilling rigs in various areas and may therefore employ types of equipment that could not be logically selected by an organization maintaining only one string of tools in the country. In this article the attempt will be made to analyze the several problems very generally, with suggestions as to how they can best be met.

In those regions in which water is scarce and of unsatisfactory quality regardless of the availability of fuel, which is to say whether the operations are in exploration or exploitation, the logical source of power is the internal combustion engine, and preferably the Diesel type in view of the substantially lower cost of Diesel fuel as compared with gasoline, and also because of the fact that the power characteristics of the Diesel engine are more satisfactory on drilling operations than are those of gasoline or butane engines. On the other hand, fuel problems may render the use of gasoline or butane preferable to the use of Diesel fuel. Where transportation problems are not severe, gasoline usually costs approximately three times as much as Diesel fuel, yet the latter will develop approximately two-thirds more horsepower per unit of volume than will the former. Therefore, under these conditions the cost of gasoline per brake horsepower hour is approximately five times the cost of Diesel oil. On the other hand, where transportation problems are severe and the primary item of cost of a gallon of fuel is transportation, the Diesel power costs will more nearly approximate gasoline power costs.

Butane usually costs slightly more per gallon than does Diesel oil where transportation is not a point of serious consideration, but the latter will develop about two-thirds more power per unit volume than will the former; therefore the fuel cost for Diesel power is only about one-half the fuel cost for butane power. An offsetting factor in the selection of the prime movers is that Diesel engines require more skillful and costly attention than do the spark plug machines and are also substantially higher in first cost.

Considering these various factors, it appears that in lower overall operating cost the advantage lies with Diesel engines unless the conditions are exceptional.

The size and type of equipment is controlled largely by the depth and size of the hole to be drilled. No longer need special consideration be given to the weight of the various pieces for transportation under ordinary circumstances, for the transportation equipment employed at the present time is such that the heaviest machine can be handled with relative ease on dry or even on damp and soft roads. Bridges are problems of course, but they are generally unnecessary in arid countries, and they can be built almost as cheaply for a 30 ton gross load as for a 20 ton burden. Generally, the heaviest single unit that cannot be broken down except with much difficulty is the power pump and if equipment and roads have to be built for this unit, there is no reason why much of the rig should not be as heavy or even much heavier. This means that unitized drawworks or drilling machines may be economically transported over properly constructed roadways.

The size and depth of the hole governs the horsepower of the prime movers to be employed and the volume and pressure capacities of the pump. Obviously for speed and economy of operation a large hole requires a large volume pump; also large volume pumps are normally capable of delivering high pressure at smaller volume. Therefore, where the problem involves large shallow holes or deep holes the same pump sizes are necessary, though for the large bore shallow holes the pumps will deliver a much smaller hydraulic horsepower and may be driven by correspondingly smaller prime movers.

A hole of 10 5/8 in. or larger size will require a minimum of 775 gal. per minute for efficient drilling. At 2,000 ft. this fluid volume will require an output of approximately 150 hydraulic horsepower or 200 b. h. p. On the other hand, this same fluid delivery at 8,000 ft. will require some 380 hydraulic horsepower or 475 b. h. p. These figures contemplate the use of 5-9/16 in. internal upset drill pipe with full hole tool joints. This is the maximum capacity of a 15 by 7¾ by 20 in. pump driven by saturated steam at 350 lb. boiler pressure. This last mentioned hole depth can be drilled at maximum efficiency with internal combustion engines only by the use of very large, heavy and costly prime movers. Rather than attempt to attain this high order of drilling efficiency with internal combustion engines, it is frequently more logical and better economy to use a lower powered fluid circulating unit. The upper limit of practical size at the present time for a Diesel or gasoline engine pump drive is probably of the order of 350-375 b. h. p. that will deliver a maximum of approximately 270 hydraulic horsepower. As the hole gets deeper and fluid pressures increase it is necessary that the liner sizes be reduced to compensate for the excess pressure. Five liner sizes may be necessary in handling fluid volumes varying from 300 gpm to 775 gpm at 1,500 lbs. to 625 lbs. discharge pressures, respectively.

For smaller deep hole sizes than 10 5/8 in., 300 to 600 gpm is usually adequate for satisfactory normal drilling efficiency. This delivery will be made at low pressure in shallow holes but as the depth increases pressure requirements will also increase rapidly until at 8,000 ft. with 4½ in. drill pipe with full hole tool joints, 430 gpm delivered at the bit will require a discharge pressure of 1,175 lbs. per square inch or 275 hydraulic horsepower delivered by a 365 b. h. p. prime mover.

The hoisting equipment to be selected likewise depends upon the size and depth of the hole to be drilled, or in other words the weight of the drilling shaft to be handled. For the lighter jobs completely unitized machines are satisfactory, though for the heavier drill pipe loads the conventional type hoist with the reverse clutch is generally more useful or is necessary, the other types not as yet having been developed for the deeper drilling jobs.

Other equipment on the rig would be that customary to any usual drilling operation and needs no discussion or specification.

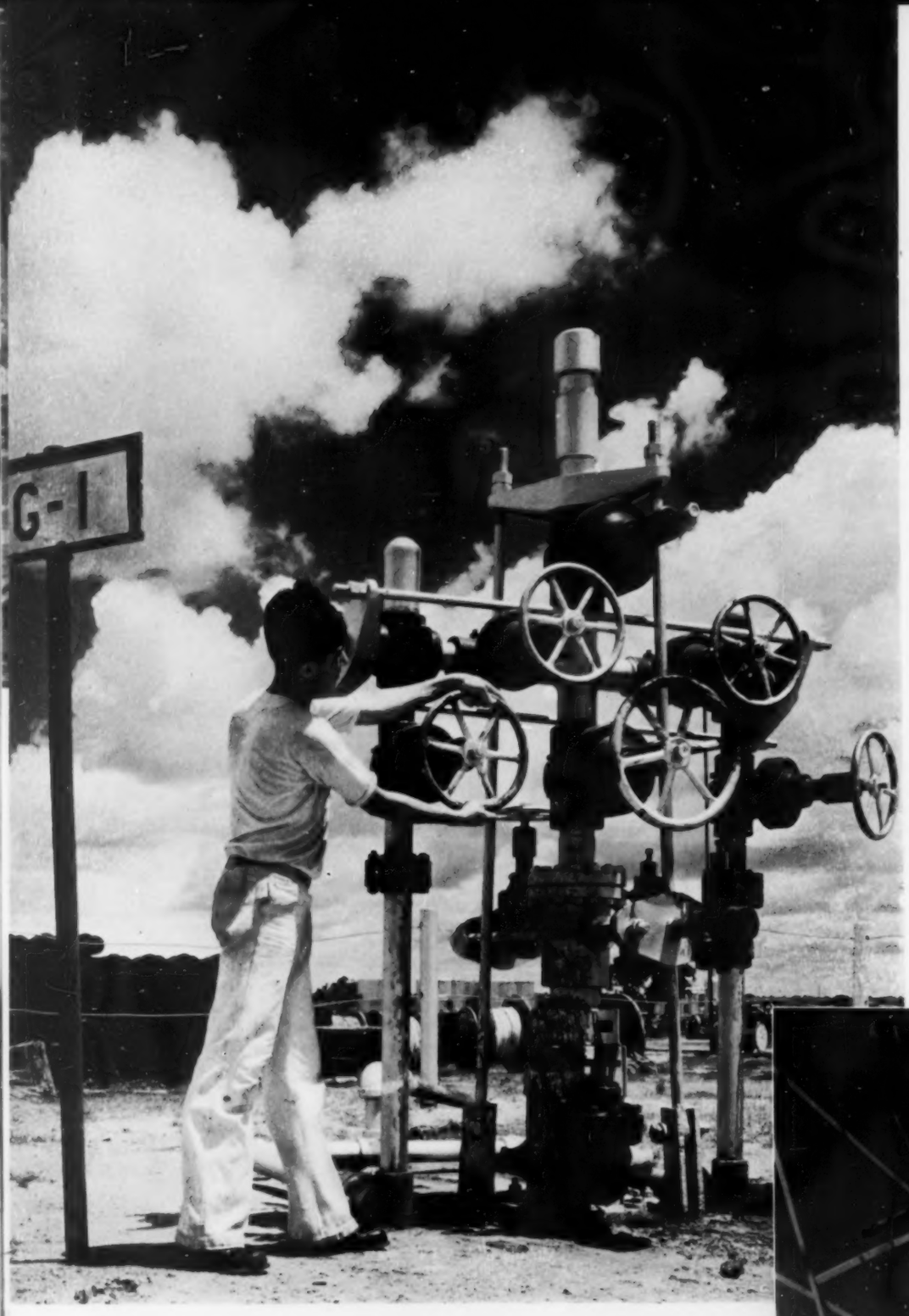
Under somewhat different local conditions, where water is adequate in quantity and quality for a steam driven rig, there remains to be determined the type of equipment that should be selected, whether steam driven or powered by internal combustion prime movers. It may be generally stated that fuel oil at $1.50 per barrel, natural gas at 30 cents per thousand, coal at $5.00 per ton and wood at $3.50 per cord, are equivalent in actual brake horsepower output to gasoline at 12c. a gallon, butane at 10c. a gallon and Diesel fuel at 15c. a gallon; but the power characteristics of steam driven equipment are so superior to those of internal combustion engines that the efficiency of the steam powered rig or the cost per effective horsepower delivered to the bit in the form of mud laden fluid and torque is easily equivalent to some 50 percent greater efficiency in total over-all hole cost, which is to say that the above mentioned steam fuel costs would be equivalent in over-all efficiency to the internal combustion engine fuels at one-half to one-fourth of the above costs for those materials. It must be borne in mind that the fuel cost is or should be a relatively small part of the daily operating cost. When considering the susceptibility to mechanical failure and rig shutdown time, the steam powered rig gains substantially more.

Another point for serious consideration is the superiority of the characteristics of the direct acting steam pump over the characteristics of a pump powered by an internal combustion engine.

Assuming that the superiority of steam powered equipment is admitted, a few cardinal principles may be discussed in the drilling of a comparatively deep hole with this type power. First, there must be considered the type fuel to be used. Obviously if the rig is on exploitation drilling it will use either fuel oil or gas; however, if it is on exploration drilling then the selection depends upon the cost of the material. If the location is within economical pipeline distance of a producing area or pipeline, oil or gas will unquestionably be the most satisfactory. On the other hand, if the location is isolated and the cost of petroleum fuels exorbitant, then wood fuel may be very logically considered if a supply is available.

Tropical fuel woods are hard, heavy, and many of them quite oily. Though there is no accurate data on their B. T. U. value, experience indicates that it is very high compared to the softer, temperate zone woods. A principal problem in using this type of fuel for steam generation is the building of a combustion chamber sufficient in size to take care of the moisture in the wood and the gases generated therein. That is to say, a large quantity of the fuel has to be in combustion at the same time in order that a sufficient amount of heat will be obtained. Such combustion chambers or dutch ovens may be built by setting the boiler at least 40 in. off the ground and extending the fireboxes behind

Unitized hot water boiler feed pumps in M. G. O. C.'s Oficina field.



the boiler (away from the smokebox) for a distance of about five feet. The depth of this outside dutch oven will be about 30 in. from the peak of the arch to the grate bars and will supply the necessary additional combustion chamber to permit an adequate quantity of fuel wood in the firebox at the same time to allow for the generation of sufficient heat to fire the boiler at not less than 100 percent of its rated horsepower capacity.

Experience has shown that good tropical fuel woods at three to four dollars a cord at the boiler plant are equivalent in value of pounds of steam generated to fuel oil at $1.00 a barrel.

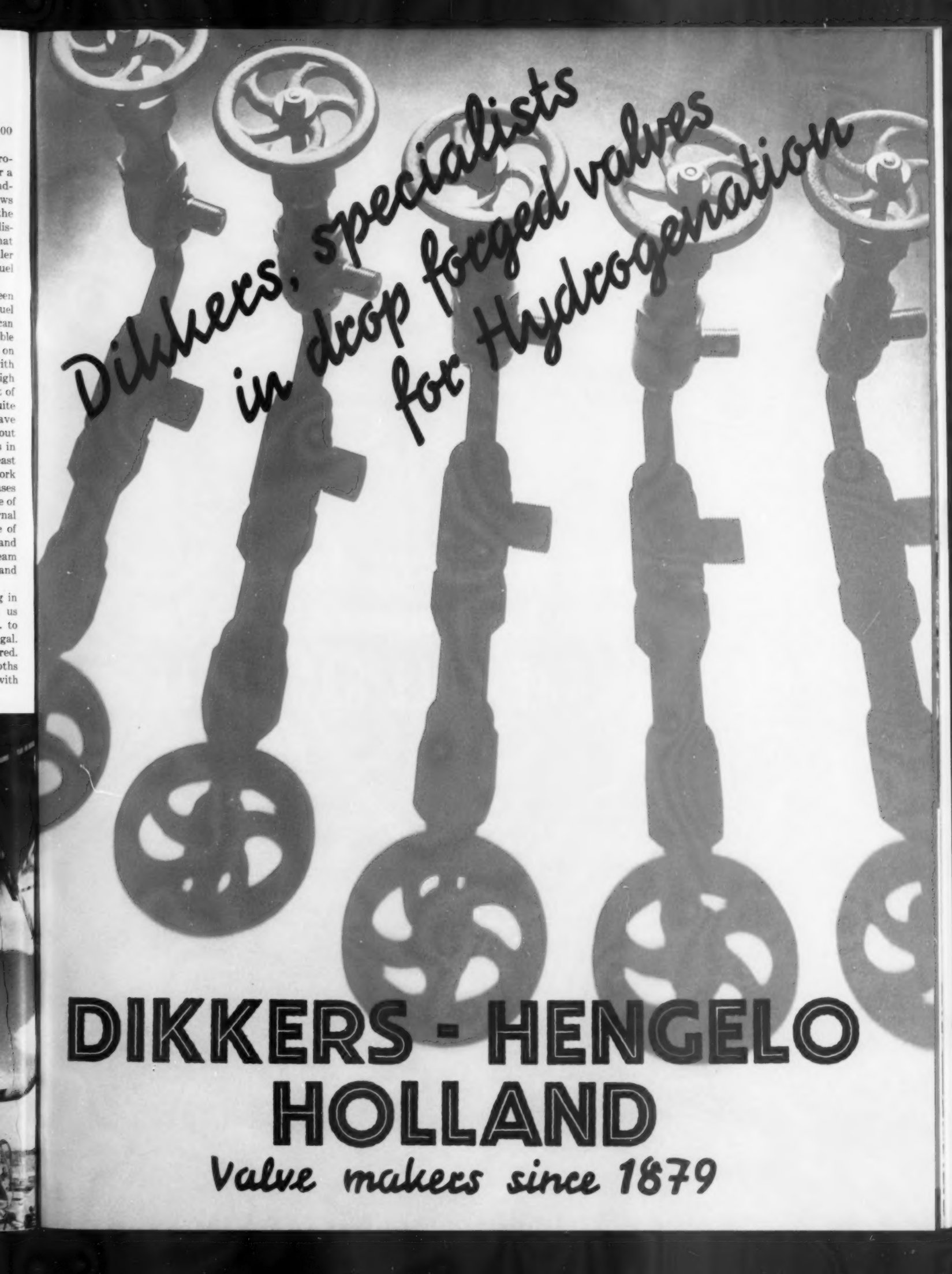
If wood is to be employed adequate provision for its supply must be maintained for a consumption of 20 to 40 cords daily, depending upon the horsepower required. Power saws and sky lines for dragging the timber to the boiler plant, or trucks for hauling from a distance, are necessary. It has been found that approximately 25 percent more rated boiler capacity is required than when oil or gas fuel is used.

It is doubtful that a well has ever been drilled in Venezuela on which wood for fuel was used, but where this is available and can be placed on the boiler location at reasonable cost, its use deserves serious consideration on wildcat wells. The writer is familiar with operations on which fuel oil costs were as high as $4.00 per barrel, giving a daily fuel cost of approximately $300. Good wood was quite abundant on these locations and could have been placed at the boiler plant for about $4.00 per cord. The saving on these wells in fuel alone would have amounted to at least $200 per day and the efficiency of the work would not have been reduced. In many cases it may even be advisable to select this type of fuel on shallow wells rather than internal combustion engine prime movers because of the freedom from mechanical trouble and consequent shutdown time. Also the steam equipment can be much more easily and efficiently operated by the crews.

Having selected the fuel the next thing in order is to choose the equipment. Let us assume a minimum hole size of 10 5/8 in. to 8,000 ft. For this job at least 750 to 800 gal. per minute of drilling fluid will be required. The fluid pressures necessary for these depths and fluid volumes in 5–9/16 in. drill pipe with

(Continued on page 103)

Above, the discovery well at Oficina: drilled by Gulf, this well is responsible for important development in Eastern Venezuela, and right, up to date drilling equipment in the Jusepin field.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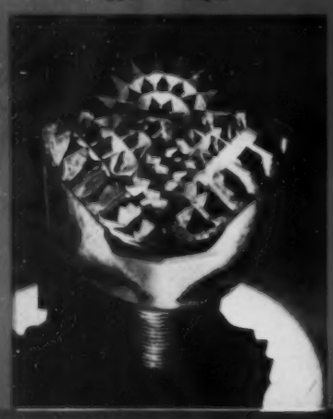

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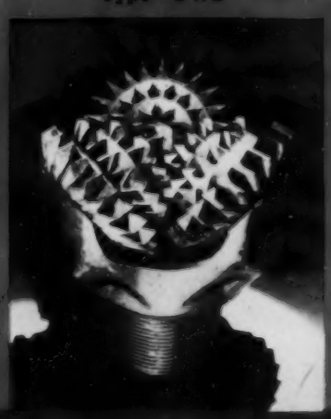

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BJ SNAPON TUBING TONGS (8) completely encircle the tubing and lock in position. They are strong enough for breaking out the joints on large diameter tubing. A "back-up" lever permits the tong to be reversed without removal from the tubing, so that cross-threads are easily corrected.

BJ "30" TUBING HOOKS (9) are popular for use in short derricks where minimum overall length is important. All BJ Tubing Hooks have the hand grip for opening the locking arm located in a protected recess in the back of hook, safe from accidental opening.

BJ "10" ROD HOOKS are designed for 10-ton loads of rods. This view (10) shows the locking arm which closes and locks when the elevator bail is seated, and can then be opened only when the operator grips and depresses the guarded latch. This type is also made in a size for 15 tons of rods.

BJ OPEN END TUBING TONGS (11) are so light in weight that they are easily stabbed on the tubing with one hand, yet they are amply strong for average needs. The tong holds fast, ratchets perfectly, but is easily removed when the operator rolls it backward and downward off the tubing.

HERE'S A SAFE, HANDY COMBINATION (12) — a BJ Rod Hook with the open locking arm serving as a guide for picking up the rod elevator bail. A stop on each side of the elevator holds the bail at the proper upright angle for a quick, safe pick-up.

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full hole tool joints will be as much as 850 or 900 lbs. for full fluid delivery. It now remains to choose the proper boiler plant steam pressure. This again is controlled by the size of the steam ends of the pumps selected. Probably for this job, the smallest steam end chosen would be 16 in. with a fluid cylinder maximum liner diameter of 7¾ to 8 in. and a piston stroke of 20 in. Considering the use of 200 lbs. saturated steam, a 16 in. steam piston with eight inch mud piston and 20 inch stroke will deliver approximately 800 gal. per minute at a maximum pressure of 490 lbs. The same pump on 250 lbs. of steam will deliver this fluid volume at 610 lbs. of pressure. On 300 lbs. of steam the same fluid may be delivered at 720 lbs. of pressure and at 350 lbs. steam pressure this pump will deliver the fluid volume at 860 lbs. It so happens that the normal discharge pressure on this pump delivering 800 gal. per minute through 5-9/16 in. drill pipe with full hole tool joints at 8,000 ft., is approximately 850 lbs. Therefore, it would appear that for maximum drilling efficiency 350 lb. boilers are required, but this is only in the lower part of the hole, and it may be desirable to sacrifice some drilling efficiency at the bottom of the hole for greater ease in handling the physical boilers and simplicity in operating the steam power plant. It may be that 250 lbs. steam pressure will be more satisfactory for all around service than will 350 lbs., and with the use of a superheater on these 250 lb. boilers the maximum pressure at full normal speed pump will be increased about 20 percent, or in this case to 740 lbs. Eight hundred gpm at 750 lbs. working pressure requires approximately 350 hydraulic horsepower or 450 delivered boiler horsepower; thus for a plant of this type using wood fuel we would require at least four boilers to operate the pump and one bolier to operate the table. There should be a minimum of one extra boiler in the plant; therefore, for a rig to drill 8,000 ft. of 10⅝ in. or 12¼ in. hole at maximum efficiency, six 125 h. p. 250 lb. working pressure boilers and one superheater would be required. This is only one boiler more than should be used under similar conditions for an oil or gas burning plant, or two boilers more than would be used under similar drilling conditions where oil or gas is used in a producing area or where replacements are readily available.

The only other parts of the rig equipment in which there is a wide range of selection is in the hoist and rotating units and their prime movers. With the experiences of the past few years with high rotating speeds and particularly on holes involving heavy weights of drill pipe, it has been found that separately powered rotary tables are to be preferred over those driven by rotary chain in the usual manner from the drawworks. These permit higher rotating speeds, less wear and tear on chain and the heavy hoisting engine, and enable repair jobs on the hoisting machinery to be carried out during drilling time. This method of rotation has been proved to be highly efficient under difficult drilling conditions in California and on the Gulf Coast. Its applicability to Venezuelan conditions is equally logical and the resultant efficiency of drilling may be expected to decrease over-all drilling costs.

Producing from the shallow water just off shore from Lagunillas: note company's power line in background.

All other parts of the rig are similar to those ordinarily employed except that the capacity of the hoisting equipment, including the hanging tools, must be sufficient to accommodate easily the maximum loads to be handled.

Equipment of the type discussed in the immediately preceding paragraphs is adequate in capacity for any reasonable depth; they may drill to 12,000 ft. or even more.

Where shallower holes are to be drilled and of smaller size, obviously lighter rigs may be employed. The boiler plant would be of less capacity, the pumps would be smaller and the hoisting and rotating equipment suited to the weights to be handled. Also drill pipe sizes would be changed to suit the conditions. First, there must be borne in mind the conditions controlling fuel and water supply and transportation. Generally speaking the first two will govern the type of equipment to be sent in to a given job. Transportation is not a serious problem at the present time because of the capacity and efficiency of the hauling units that have been placed on the market and in oil field service within recent years. Next, the size holes to be drilled and their depths are of primary importance. It may be said that the size of the hole to be drilled to a given depth should be controlled by the gravity of the oil to be produced and the volume of the wells expected. If two-inch

(Continued on page 118)

OFICINA Pipeline Opens Vast Agricultural Area

Eastern Venezuela, Now Entering Intensive Phase of Development—Will Require Extensive System of Pipelines. In Maracaibo Area Three Trunk Lines Exist All Operated By Shell.

FLYING East from Caracas toward Port of Spain, the Pan American plane has covered a little less than half the distance when it begins to lose altitude for a landing at Guanta. Guanta is a port on the Caribbean at the head of a great bay which starts swinging in a few miles east of La Guaira and swings outward again toward the pearl islands of Nueva Esparta. As the plane glides in for a landing one can see the extensive construction in progress adjacent to the village of Puerto La Cruz. Bright aluminum painted tanks crown a low hill overlooking the harbor, a long pier parallels the shore; other storage tanks, pump stations, an extensive camp are in various stages of construction. Gulf tankers may be seen tied up to the pier or maneuvering out of the harbor to start on the long voyage to Europe or North America. It is obvious that Guanta has awakened from its placid existence of the past four centuries to a new life of industrial activity. Like so much of the industrial life of Venezuela the new activity around Guanta and the construction in and around Puerto La Cruz derives from the development of a new prolific oilfield.

Stretching southward from Puerto La Cruz is a hard surfaced all weather road down which trucks rumble with supplies for Oficina, 160 km. in the interior. This road was built by the Mene Grande Oil Co. (Gulf) which operates the Oficina field and parallels the pipeline which carries crude from the field to the deep water port. It is possible to make the trip in a few hours now: a marked contrast to the days when it was necessary to go hundreds of miles around the coast by boat, past Trinidad, through the Delta Amacuro on the extreme eastern edge of Venezuela, and up the mighty Orinoco to Ciudad Bolivar. From this city, through which much of the equipment for drilling Oficina passed before the road was completed, it was possible to travel over a somewhat difficult road to the field itself. A large part of the Guanta-Oficina road lies over fertile lowlands ideal for cattle and agricultural development. Now that an outlet to the sea is furnished by the Gulf's road, a period of active development in this section and in other industries as well as oil, may be anticipated. Completion of this road has been called the most important project in Venezuela from the point of view of the people and the national economy. Rolling down the road today it is difficult to realize that not many years ago gangs of men were working and dying in these swamps and river bottoms in an unsuccessful attempt to open up the vast central plain to agriculture and commerce.

Undeterred by previous failures of other organizations, Gulf brought to bear on the problem modern road building machinery, backed up by extensive engineering experience and vast capital resources. The road had to be completed in order to facilitate work on the pipeline. And the Oficina field with a potential capacity of 30,000 bbl. per day, 20 active wells capped and awaiting an outlet and six rigs in operation, bringing in more important producers, certainly justified a pipeline to deep water.

Fleet welding a section of Mene Grande's 100 mile 16 inch pipeline from Oficina to Puerto La Cruz. First oil cargo shipped early in December 1939.

An all-welded 16 in. line was decided upon and the capacity is now about 90,000 bbl. per day. Williams Brothers Corp., S. D. Bechtel Company contracted to build the line and the welding contract was given to H. C. Price Co. Some 520,000 ft. of 16-in. A. P. I. seamless standard grade B pipe was shipped to location in 40 ft. lengths. Electric arc welding equipment arrived from North America and was mounted on trucks and tractor hauled trailers.

Starting from the Oficina tank farm 1,000 ft. above sea level where storage is available for 384,000 bbl. of crude in four 96,000 bbl. tanks, the line travels over level country to the Guanipa River crossing and thence to the town of Cantaura. Here at Km. 117 (measuring from Puerto La Cruz) the first of the two construction camps was established. At Km. 111 a smaller stream, the Guario which is dry at certain seasons, is crossed. It is only a mile from here to another river bed crossing. From this third river, the Carpintero, open clay country extends to Km. 95 where yet another river crossing was necessary for the Rio Anaoco. From this river to the Town of San Mateo at Km. 65 the country is flat and dry and must have suggested a line through Kansas to the North American construction engineers and welders. San Mateo is the largest town on the pipeline route and boasts a hotel. In the street outside there is usually to be seen a tool pusher's car, a Schlumberger truck or part of a geophysical outfit moving into the interior.

A few kilometers north of the Oficina field is the only pump station now constructed on the entire length of the line. This station consists of three 6¾ in. by 27 in. horizontal double acting plunger pumps direct connected to three vertical five-cylinder Diesel engines rated at 650 b. h. p. at 327 r. p. m. Each of these three engine-pump units is capable of delivering 35,000 bbl. of Oficina crude per day with a pressure of 800 lbs. Due to the 1,000 ft. drop in elevation from the field to tidewater this station alone furnishes sufficient pressure to move the oil the entire 156 km. to the Puerto La Cruz storage tanks.

Control valves on the line that brings crude to the San Lorenzo refinery of Caribbean Petroleum Co.

M. G. O. C. booster station and pipeline north of Lagunillas: This line runs to loading pier at Cabimas: Right, cutting out a section of the Oficina line during construction.

From San Mateo north the country becomes more swampy. At Km. 50 the line crosses the Aragua river and proceeds 14 km. to the beginning of the Bocadel Tigre swamp and the Querecual River. Difficulties were encountered in ditching this part of the route, but today the line lies buried and jungle foliage is growing back over the right of way. Much greater obstacles would have presented themselves here, as well as elsewhere along the line, if the preliminary work of road building had not permitted easy access to all points, whether swamp or mountain range.

From the swamp the line climbs steeply over a low mountain and then at Km. 34 drops into the Capiricual Valley. Swinging up out of the valley, pipeline and road lead into the Cerro Grande mountains from which the traveller gets his first view of the Caribbean. The line bends and turns through the broken terrain of the Cerro Grande, plunges abruptly downward to the Neveri river crossing at Km. 20, up again to an elevation of a few hundred feet over the Pele el Ojo and there the city of Guanta, the construction work at Puerto La Cruz and the glistening tanks on the hill spread out before one, the terminal of the line only 12 km. away.

As mentioned, the entire line was electric arc welded, the roll weld method being used on the plain-end pipe. The first gang tack welded the pipe with equipment mounted on trucks and following the highway. They were followed by a second crew which completed the weld. Anywhere from six to 15 of the 40 ft. sections were welded together. When the welding was completed and tested, the line was cleaned, primed and treated by the recently perfected pipeline machine capable of coating the pipe with hot enamel and wrapping it in asbestos felt. The line was coated throughout and wrapped along its entire length except where it ran through dry sandy soil.

At Puerto La Cruz the line feeds into four 96,000 bbl. cone roof all-welded tanks which at present comprise the storage capacity of the new terminal. On December 15, 1939, however, work started on six additional 96,000 bbl. cone roof all-welded tanks adjacent to the four that were already there. By spring there will be capacity for more than 960,000 bbl. of crude.

As mentioned above these 10 tanks will be used entirely for storage and are set at the foot of a small hill. Crude is pumped to the top of the hill by a pump station consisting of three single stage, double suction centrifugal pumps direct connected in each case to a 150 h.p. 2,200 volt squirrel cage induction motor. Each pump and motor is mounted as a unit on a single cast iron base and each of the units has a capacity of 2,500 bbl. per hour of 29 deg. A. P. I. crude..

Power for the station is derived from two 350 Kw. 2,400 volt generators direct connected by V-belt drive to two vertical, five-cylinder, Diesel engines with a rated power output of 500 h.p. at 327 r.p.m. using crude oil for fuel. This power generating station also supplies electricity for other purposes around the port.

Atop the hill are the loading tanks: four 139,000 bbl. floating roof all-welded tanks at

an elevation of 80 to 130 ft. From here Oficina crude flows by gravity through two 24 in. lines to the oil loading pier. Spread out along the bay is the new terminal port consisting of two main features. The first is, of course, the 1,320 ft. concrete oil loading dock carrying the 24 in. loading lines along the shore. A channel to and alongside the docks has been dredged to 35 ft. so that the dock can accommodate two of the largest and deepest draught sea-going tankers simultaneously. Near the oil loading dock may be seen a shorter (440 ft.) concrete materials dock with warehouse and storage yard accommodation at its base for incoming oilfield equipment. Arranged along the shore of the harbor convenient to these two docks will be offices, warehouses, garages and all the necessary buildings for a terminal destined to be of increasing importance. Living quarters, hospital and school will be some distance from the docks.

While the line from Oficina is the largest diameter crude pipeline in the world, and perhaps the most impressive in Venezuela, construction is just being completed on a line from Jusepin field to Quiriquire where it will hook up with the existing outlet from Quiriquire to the Caripito field and a marine terminal on the San Juan river. Tankers are partially loaded at the Port of Caripito, move down the river, out across the bar into the Gulf of Paria and there have their cargoes topped off with oil pumped from shallow draught tankers moored outside the bar. This line from Jusepin to Quiriquire was also constructed by the Williams Brothers.

The only other pipeline in Eastern Venezuela is the 50 km. line from Temblador to Boca de Uracoa at Manamo in the Delta Amacuro. This delta, is formed at the mouth of the Orinoco, the third largest river in the world and the Delta Amacuro is proportionately large. Boca de Uracoa is, however, shallow in spots so shallow draught tankers transport Temblador crude to a terminal at Guiria in the Gulf of Paria where it is transferred to sea-going tankers.

In Western Venezuela there are pipelines of some importance between certain of the fields and shipping points in the Maracaibo Basin itself, and they are all operated by the Shell Group. The most important of these starts in the Colon District.

This line, which was laid in 1929, and has a capacity of 20,000-25,000 bbl. daily, runs from Casigua, the center of the Tarra field, to Coloncha on the southwest shore of Lake Maracaibo, a distance of 137 km. As will be seen from the map, the pipeline is by no means straight, as length had to be sacrificed to the avoidance of some of the worst terrain in the territory between the producing areas and the Lake. Even so, it was necessary to lay long lengths of the line on trestles to prevent sinking of the pipe in the large areas of swamps which could not be avoided. One section of the line, comprising about 30 km., could only be laid after building a light railway for transporting the pipe across the swamps, and this railway has been kept in operation for the purpose of inspection and maintenance.

Las Cruces production is pumped from the main tank farm at Casigua by horizontal duplex compound pumps, designed to deliver up to 72 tons per hour each, against 850 lbs. pressure, and the Los Manueles production is pumped into the line at Km. 10.5 by one similar pump and three smaller pumps.

Between the fields and loading terminal there are two intermediate pumping stations, at Calvario (Encontrados) and Rivera (Bobores), each having one 20,000 bbl. and one 5,000 bbl. tank and three horizontal duplex compound pumps. The loading station at Coloncha consists of five 20,000 bbl. tanks and two steam turbine-driven centrifugal pumps of 390 tons per hour capacity each. From this loading station there are two kilometers of 12 in. line to the Lake shore itself and from there to the loading platform which is constructed in the Lake on piles and measures 190 ft. by 30 ft., twin eight inch submarine lines three kilometers long, making a total distance for the line from Casigua to the tanker berth of 142 km.

The line, which was put into regular operation in January 1930, cost over $2,500,000.

The next pipeline, in order of importance, operated by the Shell Group, is that of the V. O. C. running from La Paz and La Concepcion fields to Punta Piedras, which is a Lake terminal just south of the City of Maraciabo. The length of the line, which is six inches in diameter, is 45 km. from La Concepcion to Punta Piedras, and its maximum capacity is 2,400 tons per day at 800 lbs. pressure. This line was put into operation in 1925. There are

(Continued on page 122)

Top row, left to right: E. L. Decker, W. F. Bettis, W. R. Martin, Frank Champion, and H. John Eastman.

Left, top to bottom: E. L. Decker, F. C. Ripley, R. J. Eiche, Leland S. Hamer, S. R. Bowen, and J. E. Elliott.

Nomads of the Oil Equipment World

By James H. Collins

THE December dinner of the Nomads, in Los Angeles, marked the first anniversary of an unusual organization among oil men, and those who developed the idea in the fall of 1938 felt that they had done a good job for themselves, and the industry.

The Nomads are oil equipment men who travel in foreign lands on all sorts of professional and business missions. Nobody else is eligible for membership, but equipment men engaged in export activities can become associate members, and from time to time men who are outstanding in foreign service for oil companies may be elected honorary members.

The formal name of the club—for it is really a dinner club—is the National Oil Equipment Manufacturers and Delegates Society, and "Nomads" was coined from the initials, for short.

There are now about 65 members in the Los Angeles branch which is the parent chapter. The purpose of the founders was that the Nomads should develop into a national organization, and clubs have since been formed in Houston, Texas, and Tulsa, Oklahoma.

Ever since California began to take a prominent place in oil equipment, men have traveled to foreign countries to study conditions, and sell and install equipment. "Join the Marines and see the world," the slogan of the United States Marine service, has been true of equipment men—the industry has its industrial marines.

Naturally, they have interesting experiences, and it was for the exchange of these experiences that a few of them met to see what could be done to enjoy more frequent contacts.

Many of these equipment men are business competitors, and so the organization was founded strictly for social, fraternal and educational purposes only, business being left outside its meetings.

Again, many foreign oil engineers and producers are constantly visiting Los Angeles, and it was planned that these strangers within the gates be entertained at the monthly dinners which are the chief function of the organization.

The dinners have proved so interesting that attendance runs well above 100 on the average. Invitations are sought from many quarters but the attendance is kept rather closely within the oil industry.

Members are always coming back from some distant spot, and have interesting experiences to relate. For example, at the December dinner, Bart Gillespie, engineer and geologist, who has worked all over South America, spoke of his latest visit to the fields in Argentina, and Walter Elliott, of the Shell Oil Company in Los Angeles, told of his recent trips to the Venezuelan fields, and also his brief visit to Europe at the outbreak of war.

Right, George Ratcliffe, seated on right behind desk and W L. Heater.

Group picture on left: Front row, left to right: D. B. Church, Mason-Neilan Regulator Co.; W. R. Braden, Braden Steel Corp.; J. E. Richard, National Tank Co.; Dr. C. K. Francis, Oil & Gas Journal; P. E. Fitzgerald, Dowell Inc.; A. J. Edwards, Black, Sivalls & Bryson; C. O. Willson, Oil & Gas Journal; Don R. Hinderliter, Hinderliter Tool Co.; G. S. Connors, Williams Bros. Corp.; Charles T. Tower, Contractor.

Back row, left to right: Leslie Brooks, Publicity Director, I.P.E.; R. P. Clark, Manufacturers' Representative; J. S. Golden, Guest; Shep Miers, Kerotest Mfg. Co.; Fred E. Cooper, Fred E. Cooper Division, Allis-Chalmers; W. C. Wadsworth, Westcott Valve Co.; Frank Wheatley, Wheatley Bros., Mfg. Co.; Paul M. Raigorodsky, Petroleum Engineering, Inc.; H. M. Cosgrove; R. P. Green, Seismograph Service, Inc.

Among a large number of foreign guests were George Wilzleben, of U. B. O. T., Trinidad; D. D. Lewis, of Standard of Venezuela, Caripito; Messrs. D. Fleming and Gunst, of the Royal Dutch Shell interests at the Hague; Eric Eager and Archie Brown, of the Caribbean Petroleum Company, from Venezuela; Dr. Von Heinigan, of B. P. M., from the Hague; Charles Lilly, of California Arabian Standard Oil Co.; Earl Grainger, of the Shell interests in Maracaibo; C. C. Sutton, of the Caribbean Petroleum Company, Maracaibo; Ernie Smith, California Arabian Standard Oil Company; Thomas Thomas, of Imperial Oil, Ltd., and so on.

The speaker of the evening was Dr. Gustave F. Struve, who on a botanical expedition started from Argentina in 1914, was captured by head hunters in the upper Amazon basin, became a member of their tribe, married their medicine man's daughter, and after five years escaped with his six-months-old son, reaching Guayaquil, Ecuador, all others in his party having been killed or died. Dr. Struve is now an American citizen, and his son an officer in the Argentine army. He displayed several shrunken heads, and the complete shrunken body of an Indian.

At the previous dinner, Russell Palmer showed his motion pictures of the Spanish war, and related his experiences in taking them, and every month there are members coming back from foreign lands, often with motion pictures of oil exploration, or of strange countries or peoples.

Quite apart from its social and educational aspects, the organization has been instrumental in facilitating the work of oil men who visit California either to study oil field methods or to investigate oil equipment.

Even before the development of Los Angeles as a passenger port, many oil men came to pursue technical studies. Generally, they made contacts with equipment houses that they knew through their dealings, or through foreign representatives who had visited their localities, and were passed along to other men in the equipment business or the producing fields, so that they might see what they were interested in.

Almost immediately on the organization of the club, the Nomads became a clearing house for these visitors. Attending one of the dinners, they made direct acquaintance with men who could direct them to the things that they wanted to see, and who often could suggest things they had not heard of.

This led equipment manufacturers to pay more attention to visitors' requirements, and to organize tours and lay out routes which enable the stranger within the gates to see more in his particular line of interests than was possible before, and to do it in less time.

Today, the visitor will not be long in Los Angeles before meeting a Nomad, for they are everywhere in the equipment industry, and after that, the whole California oil region is his to explore in whatever way he desires.

A prime mover in the organization of this informal, friendly club was E. L. Decker, of the Martin-Decker Corporation, Long Beach. He has served as its first president. Other officers are: F. C. Ripley, Emsco Derrick & Equipment Company, vice-president; W. F. Bettis, M. O. Johnston Oil Field Service Corporation, secretary-treasurer; Earl Rees, Fluid Packed Pump Company, assistant secretary-treasurer; Henry Pullman, Baker Oil Tools, Inc., sergeant-at-arms; E. B. Fowks, of Emsco, assistant sergeant-at-arms.

An amusing detail of organization was the naming of officers. It was thought that titles characteristic of nomads throughout history, such as "grand sheik" for president, would lend color. But a very little research into the history of nomads through the ages revealed such a bewildering array of terms, that the notion was dropped. Man was a nomad before the dawn of history, and some of the titles that might have been used held possibilities of offense, such as those connected with the Moslem religion. So, the plain titles of business have been considered satisfactory.

Charter members of the Los Angeles Nomads, in addition to the officers mentioned above include J. C. Axelson, Axelson Mfg. Co.; S. R. Bowen, S. R. Bowen & Co.; Frank Champion, Byron Jackson Co.; Joe Dunn, National Supply Co.; John Eastman, East-

(Continued on page 120)

Right, from top to bottom: Ted Sutter, H. C. Morehouse, E. B. Fowks, Earl Rees, Henry Pullman, and Rex Hamaker.

Bottom row, left to right: Roy McCullom, J. A. Dunn, A. A. Haglund, John Grant, and Rex Hamaker.

WORLD OIL

All figures furnished direct to WORLD PETROLEUM by governments, except where otherwise specified

U. S. BARRELS

	Nov. 1938	Dec. 1938	Jan. 1939	Feb. 1939	Mar. 1939	Apr. 1939	May 1939	June 1939	July 1939	Aug. 1939	Sept. 1939	Preliminary Figures Oct. 1939
United States	98,567,000	102,287,000	102,490,000	93,475,000	106,768,000	105,510,000	110,541,000	104,607,000	110,937,000	80,865,000	108,168,000	114,197,800
Soviet Union[4]	17,250,000	17,050,000	17,000,000	17,500,000	18,000,000	18,100,000	18,500,000	18,700,000	18,200,000	18,100,000	18,000,000	18,437,932
Venezuela	16,356,204	16,744,163	16,489,347	14,899,459	15,646,415	16,980,646	17,676,580	16,430,693	18,015,249	18,743,714	18,652,354	17,434,307
Iran[1]	7,221,080	6,624,726	6,609,457	5,138,929	7,218,225	7,471,217	6,801,192	6,341,652	6,778,987[1]	6,778,987[1]	6,560,310[1]	6,778,088
Netherland India: Sumatra	3,015,432	3,177,589	3,129,007	2,969,950	3,393,286	3,400,503	3,602,543	3,498,094	3,557,020	3,550,123	3,502,437	3,474,852
Borneo	1,090,009	1,114,535	1,115,570	1,000,937	1,134,647	1,123,474	1,173,509	1,154,341	1,156,942	1,111,810	865,693	1,151,061
Java[9]	515,160	529,658	535,297	503,441	550,097	509,355	530,273	514,565	565,181	559,096	511,355	547,088
Ceram	45,750	45,773	49,200	55,219	67,442	82,914	89,975	77,305	73,962	71,767	68,065	72,850
Roumania	3,847,324	3,969,300	3,953,671	3,665,559	3,973,053	3,743,911	3,840,413	3,684,366	3,902,333	3,958,612	3,795,308	3,842,567
Mexico[3]	3,098,725	3,245,558	2,470,000[1]	1,960,000[1]	3,118,021	3,140,120	2,945,000[1]	3,100,000[1]	3,245,000[1]	3,700,000[1]	4,050,000	4,500,000
Iraq	2,420,143	2,290,777	2,414,878	1,955,122	2,699,272	2,608,216	2,663,827	2,721,992	2,807,402	2,735,000	2,640,307	2,639,650
Colombia	1,863,838	1,908,879	1,710,565	1,633,621	1,818,765	1,826,928	1,899,735	1,851,716	1,798,271	1,950,966	1,894,941	1,860,620
Trinidad	1,503,489	1,664,322	1,652,412	1,499,197	1,630,789	1,569,298	1,645,040	1,575,321	1,620,564	1,640,000	1,636,985	1,643,062
Argentina[1]	1,358,000	2,028,000	1,534,000	1,430,000	1,556,000	1,549,000	1,556,000	1,530,000	1,556,000	1,556,000	1,559,683	1,570,057
Peru[4]	1,303,990	1,321,883	1,251,162	1,103,878	1,210,288	1,151,193	1,078,426	1,051,265	1,100,000[1]	1,100,000	1,157,210	1,158,625
Bahrein[5]	613,281	623,907	647,988	610,766	658,822	629,336	626,009	628,812	671,092	698,714	647,595	660,858
Burma[1]	591,029	651,495	698,103	424,277	600,863	581,633	696,936	665,942	628,153[1]	628,153[1]	607,890[1]	628,153
Canada[2]	445,514	489,303	535,166	358,176	385,273	559,368	713,947	821,308	899,169	795,844	720,866	669,755
Brunei[6]	484,207	510,500	506,467	453,571	492,374	466,328	486,815	472,162	498,650	499,000	497,454	496,527
Great Germany: Old Reich[16]	307,433	313,206	332,592	330,584	395,181	373,126	409,782	373,510	391,098	410,000	384,573	386,105
Ostmark[16]	29,000[1]	34,259	33,609	46,666	43,293	54,375	64,840	78,944	85,131	87,000	62,592	63,178
Slovakia and Moravia	10,502	9,879	10,546	9,000[1]	10,000[1]	9,000[1]	10,000[1]	9,000[1]	11,000[1]	11,000	10,520	10,230
Poland	318,000[1]	316,702	325,293	298,259	333,618	326,406[8]	333,800[1]	318,000[1]	330,000[1]	330,000	330,264	332,196
Japan[10]	224,255	173,737	224,885	218,594	222,368	218,594	221,229	220,814	221,758	210,105	222,513	222,701
British India[11]	197,809	217,528	253,874	213,185	236,042	105,477	127,700	137,070	183,830[1]	183,830[1]	177,900[1]	183,830
Ecuador	185,669	192,882	195,556	171,634	181,938	175,896	193,753	193,710	206,868	204,115	197,780	193,382
Saudi Arabia	152,632	139,038	155,605	170,865	215,270	234,742	281,325	392,932	342,558	350,000	538,136	512,590
Sarawak[12]	115,952	118,512	116,030	105,714	115,980	110,982	112,572	106,077	109,797	112,000	116,571	114,204
Egypt[13]	211,841	221,156	308,946	301,102	330,445	328,376	369,972	426,808	436,519	440,678	375,951	376,836
Italian Empire: Albania[18]	Nil	6,220	99,206	67,914	125,440	244,576	81,839	79,971	140,025	89,000	111,276	117,986
Italy	8,533	7,937	7,511	8,090	8,324	7,797	7,253	7,181	6,843	7,600	7,736	7,750
France	40,797	48,000[1]	42,000[1]	40,000[1]	42,000[1]	41,000[1]	42,000[1]	41,000[1]	42,000[1]	42,000	42,653	42,470
Hungary	43,303	47,671	49,199	49,578	67,261	67,000[1]	70,000[1]	67,000[1]	70,000[1]	70,000	65,210	65,317
Bolivia[1]	8,500	9,000	8,800	7,000	8,700	8,500	8,700	8,500	8,700[1]	8,700	7,893	8,536
Other Countries[17]	50,000	48,000	50,000	35,000	50,000	48,000	50,000	48,000	50,700	50,700	50,000	49,073
WORLD TOTAL	163,494,401	168,181,095	167,005,942	152,710,287	173,262,492	173,357,281	179,451,985	171,935,065	172,076,544	151,649,509	178,238,029	184,450,256

[1] Estimated.
[2] Includes natural gasoline (naphtha) production.
[3] International Petroleum Company and Lobitos Oilfields, Ltd., figures combined.
[4] Russian Saghalin included with U.S.S.R.
[5] Anglo-Iranian Oil Company, Ltd., figures revised —fuel oil returned to the ground has been deducted.
[6] Bahrein Petroleum Company, Ltd., figures.
[7] Does not include Assam or Punjab, which are listed together under British India.
[8] British Malayan Petroleum Company, Ltd., figures.
[9] Includes Madura.

Comparative Cumulative Daily Averages in Barrels

	Jan.-Oct. 1939	Jan.-Oct. 1938
United States	3,413,002	3,335,421
Soviet Union	593,874	565,905
Venezuela	562,397	505,372
Iran	218,648	210,042
Netherland India: Sumatra	112,098	93,343
Borneo	36,144	34,742
Java	17,518	19,760
Ceram	2,331	1,703
Roumania	126,183	136,309
Mexico	106,013	92,011
Iraq	85,150	86,486
Colombia	60,020	58,304
Trinidad	53,002	47,523
Argentina	50,647	44,655
Peru	37,375	43,777
Bahrein	21,318	23,632
Burma	20,263	20,703
Canada	21,246	19,474
Brunei	16,017	14,431
Great Germany: Old Reich	12,455	10,614
Ostmark	2,038	963
Slovakia and Moravia	330	354
Poland	10,716	10,470
Japan	7,248	6,933
British India	5,930	6,254
Ecuador	6,298	6,176
Saudi Arabia	10,506	243
Sarawak	3,683	4,275
Egypt	12,156	3,369
Italian Empire: Albania	3,807	1,463
Italy	250	297
France	1,372	1,422
Hungary	2,107	709
Bolivia	276	294
Other Countries	1,584	355
WORLD TOTAL	5,605,715	5,422,853

Official Crude Oil Production Figures for 1932 to 1938 (Revised) in Barrels

	1938	1937	1936	1935	1934	1933	1932
United States	1,213,254,000	1,279,160,000	1,098,516,000	996,596,000	908,865,000	905,656,000	785,159,000
Soviet Union	206,192,000	201,856,661	199,635,921	184,008,033	175,635,783	155,596,429	155,927,997
Venezuela	173,506,497	187,675,477	155,270,840	148,809,057	136,098,681	117,113,940	115,615,782
Iran	78,320,840	78,109,001	62,977,950	57,520,488	57,902,092	54,440,075	49,516,697
Netherland India: Sumatra	34,538,128	33,451,511	30,469,428	28,004,595	26,336,011	22,345,172	18,570,928
Borneo	12,812,383	12,960,072	13,068,910	13,529,185	14,335,543	15,003,175	15,228,615
Java	6,955,283	7,152,931	3,618,293	3,462,440	3,778,920	3,600,816	3,837,142
Ceram	607,622	537,436	375,823	311,872	273,698	285,335	309,957
Roumania	48,366,000	52,395,725	63,532,846	61,270,072	61,849,306	53,919,708	53,651,978
Mexico	38,505,824	46,455,687	41,027,915	40,240,563	38,171,946	34,000,830	32,805,496
Iraq	32,404,000	30,603,660	29,913,150	27,410,983	7,639,849	1,094,915	87,840
Colombia	21,581,588	20,297,543	18,756,110	17,597,655	17,337,900	13,156,126	16,415,214
Trinidad	17,736,176	15,502,989	13,237,030	11,671,224	10,894,363	9,561,353	10,126,121
Argentina	17,076,223	16,354,717	15,457,960	14,297,025	14,021,901	13,690,556	13,138,747
Peru	15,908,279	17,459,112	17,593,069	17,056,555	16,314,381	13,257,318	9,899,265
Bahrein	8,297,998	7,762,264	4,644,635	1,264,807	285,072	31,377	902
Burma	7,499,498	7,847,553	7,587,718	7,181,113	7,278,859	7,114,311	7,073,437
Canada	6,936,479	2,995,025	1,507,931	1,447,204	1,410,895	1,145,333	1,044,412
Brunei	5,387,214	4,397,038	3,296,938	3,302,905	2,705,350	2,035,656	1,200,026
Great Germany: Old Reich	3,850,044	3,148,300	3,076,858	2,967,438	2,204,402	1,656,602	1,594,807
Ostmark	370,038	221,266	50,092	44,347	27,965	5,765	804
Slovakia and Moravia	130,867	122,790	126,603	136,580	177,797	121,695	126,603
Poland	3,828,438	3,799,862	3,869,575	3,901,881	4,011,336	4,174,079	4,219,634
Japan	2,511,184	2,487,841	2,403,072	2,294,878	1,872,837	1,504,412	1,683,439
British India	2,330,209	2,161,653	1,978,329	2,037,810	1,921,863	1,628,803	1,743,878
Ecuador	2,257,278	2,161,436	1,942,467	1,731,785	1,636,619	1,619,902	1,597,641
Saudi Arabia	495,135	64,968	19,777	Nil	Nil	Nil	Nil
Sarawak	1,624,882	1,655,565	1,547,882	1,776,593	1,942,591	2,206,815	2,329,733
Egypt	1,561,231	1,163,267	1,262,666	1,255,151	1,527,252	1,653,535	1,071,976
Italian Empire: Albania	437,597	380,292	219,693	41,218	17,580	11,437	9,212
Italy	106,083	112,700	129,653	128,615	162,449	213,534	242,563
France	516,240	507,067	534,063	529,664	700,000	786,366	755,146
Hungary	330,829	13,910	100	Nil	Nil	Nil	Nil
Bolivia	106,620	123,123	104,746	163,295	157,875	111,973	41,907
Other Countries	243,000	70,000	37,100	32,300	64,000	54,100	73,300
WORLD TOTAL	1,966,585,707	2,041,168,442	1,797,791,150	1,652,023,331	1,516,760,036	1,438,797,443	1,305,100,199

PRODUCTION

Figures in U. S. barrels of 42 gal.—Conversion ratios used are weighted averages for individual countries

METRIC TONS

	Nov. 1938	Dec. 1938	Jan. 1939	Feb. 1939	Mar. 1939	Apr. 1939	May 1939	June 1939	July 1939	Aug. 1939	Sept. 1939	Preliminary Figures Oct. 1939
United States	13,343,306	13,846,893	13,874,374	12,653,243	14,445,677	14,275,470	14,956,000	14,153,000	15,009,700	10,941,000	14,608,036	15,450,953
Soviet Union[4]	2,366,000	2,339,000	2,332,000	2,400,000	2,469,000	2,480,000	2,536,000	2,590,000	2,508,000	2,480,000	2,300,000	2,508,024
Venezuela	2,417,054	2,474,385	2,438,207	2,201,782	2,323,150	2,521,254	2,624,585	2,439,598	2,674,870	2,783,081	2,769,466	2,586,268
Iran[5]	955,040	876,168	849,376	660,400	927,608	960,120	874,015	814,960	871,162[1]	871,162[1]	843,060[1]	871,162
Netherland India: Sumatra	404,756	426,522	420,001	398,651	434,424	435,476	461,214	447,842	455,386	454,503	448,398	449,190
Borneo	146,310	149,602	149,741	134,354	146,543	142,552	150,238	147,784	148,117	142,339	110,830	144,522
Java[6]	69,149	71,095	71,852	67,576	70,426	65,210	67,888	65,877	72,357	71,578	65,466	70,184
Ceram	6,141	6,144	6,604	7,412	8,634	10,615	11,519	9,897	9,469	9,188	8,842	9,331
Roumania	525,232	541,884	536,091	497,025	538,719	507,645	520,734	499,575	536,761	536,761	514,618	521,026
Mexico[16]	460,025	481,823	367,000[1]	291,000[1]	457,859	461,104	432,000[1]	455,000[1]	477,000[1]	543,316[1]	594,713	660,793
Iraq	324,503	312,734	323,797	262,151	360,817	348,648	356,079	363,854	375,271	376,000[1]	352,935	354,237
Colombia	259,768	266,046	238,406	229,371	253,663	254,802	264,956	258,258	250,805	272,101	264,287	259,656
Trinidad	211,580	234,214	232,537	210,413	229,306	220,717	231,370	221,564	227,927	231,000[1]	230,237	231,074
Argentina[1]	193,500	288,930	218,000	202,000	221,000	220,000	221,000	217,500[1]	221,000	221,000	222,177	222,983
Peru[1]	172,805	175,667	166,281	146,286	159,774	151,973	142,367	138,782	146,000[1]	146,000[1]	152,768	153,326
Bahrein[8]	83,585	85,009	88,264	83,180	89,811	85,920	85,353	85,840	91,642	95,348	88,372	90,117
Burma[7]	81,634	89,985	82,992	58,602	96,423	80,336	96,261	91,980	86,738[1]	86,738[1]	83,940[1]	86,738[1]
Canada[9]	56,280	61,812	68,244	45,581	49,029	71,018	90,856	104,518	114,427	101,278	91,736	83,638
Brunei[9]	63,491	66,939	66,410	59,474	65,749	62,271	65,007	61,996	65,474	65,500[1]	65,317	65,534
Great Germany: Old Reich[14]	45,865	45,111	47,562	47,614	56,654	53,357	58,205	53,412	55,927	58,300[1]	54,994	55,180
Ostmark[13]	5,600[1]	5,111	5,014	6,962	6,454	8,106	9,666	11,289	12,691	13,000[1]	9,331	9,362
Slovakia and Moravia	1,534	1,443	1,545	1,500[1]	1,500[1]	1,400[1]	1,500[1]	1,400[1]	1,600[1]	1,600[1]	1,550	1,519
Poland	42,000[1]	42,688	43,819	40,202	44,968	44,000[1]	45,000[1]	41,000[1]	45,000[1]	45,000[1]	44,516	44,671
Japan[10]	31,913	24,724	32,003	31,094	31,631	31,095	31,469	31,410	31,544	29,886	31,651	31,678
British India[11]	27,322	30,045	35,065	29,445	32,602	14,568	17,638	18,932	25,389[1]	25,389[1]	24,570[1]	25,389[1]
Ecuador	26,314	27,336	27,715	24,325	23,986	23,190	25,544	25,670	27,272	26,910	26,076	26,195
Saudi Arabia	20,697	18,590	21,100	23,169	29,190	31,821	38,148	41,078	46,450	47,500	71,751	72,971
Sarawak[12]	15,204	15,540	15,214	13,862	15,838	14,197	14,401	13,343	13,811	14,300[1]	14,663	14,725
Egypt[15]	30,285	31,617	44,390	43,045	47,193	46,897	52,838	60,955	62,342	62,936	53,692	53,847
Italian Empire: Albania[16]	Nil	41,674	14,869	10,179	18,801	36,657	12,266	11,980	20,987	13,000[1]	16,678	17,639
Italy	1,060	986	933	1,005	1,034	968	901	892	850	950[1]	961	961
France	5,713	6,000[1]	5,900[1]	5,500[1]	6,000[1]	5,700[1]	6,000[1]	5,700[1]	6,000[1]	6,000[1]	5,983	5,983
Hungary	5,602	6,167	6,619	6,670	9,049	9,000[1]	9,500[1]	9,000[1]	9,500[1]	9,500[1]	8,773	8,804
Bolivia[1]	1,000	1,130	1,100	900	1,000	1,000	1,000	1,000	1,000[1]	1,000[1]	1,023	1,023
Other Countries[17]	7,000	6,700	7,000	6,000	7,000	6,700	7,000	6,700	7,100	7,100	7,000	6,975
WORLD TOTAL	22,407,268	23,099,714	22,840,025	20,899,973	23,680,692	23,683,787	24,518,517	23,501,586	24,655,937	20,779,724	24,178,410	25,185,138

[4] Japanese Saghalin, Taiwan (Formosa) and Hokkaido included with Japan.
[11] Excluding Burma.
[12] Sarawak Oilfields, Ltd., figures.
[13] Anglo-Egyptian Oilfields, Ltd., figures.
[14] Prussia, Thuringia and Baden.
[15] Formerly known as Austria.
[16] Italian imports of Albanian crude oil.
[17] Estimate representing Morocco, Cuba, New Zealand, Barbados, Greece, Algeria, Yugoslavia, Australia, Great Britain, Kuweit and China.
[18] Official Figures—Petroleos Mexicanos.

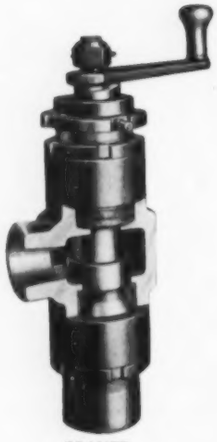
Comparative Cumulative Daily Averages in Metric Tons

	Jan.-Oct. 1939	Jan.-Oct. 1938
United States	461,735	447,815
Soviet Union	80,904	79,332
Venezuela	83,428	74,687
Iran	28,102	27,780
Netherland India: Sumatra	14,490	12,534
Borneo	4,661	4,663
Java	2,264	2,652
Ceram	301	228
Roumania	17,134	18,206
Mexico	15,591	13,170
Iraq	11,426	11,597
Colombia	8,376	8,126
Trinidad	7,454	6,688
Argentina	7,192	6,368
Peru	4,945	5,764
Bahrein	2,907	3,170
Burma	2,807	2,874
Canada	2,698	2,460
Brunei	2,114	1,883
Great Germany: Old Reich	1,780	1,514
Ostmark	302	155
Slovakia and Moravia	49	52
Poland	1,441	1,379
Japan	1,031	982
British India	821	863
Ecuador	845	875
Saudi Arabia	1,392	32
Sarawak	474	561
Egypt	1,735	481
Italian Empire: Albania	569	216
Italy	31	36
France	193	198
Hungary	284	91
Bolivia	33	36
Other Countries	225	50
WORLD TOTAL	769,472	737,152

Official Crude Oil Production Figures for 1932 to 1938 (Revised) in Metric Tons

	1938	1937	1936	1935	1934	1933	1932
United States	163,228,715	172,822,797	148,707,864	134,912,143	122,913,903	122,601,191	106,289,292
Soviet Union	28,859,000	27,867,025‡	27,384,900	25,241,100	24,092,700	21,330,100	21,389,300
Venezuela	27,845,286	27,733,926	22,945,299	21,990,373	20,112,115	17,293,193	17,085,334
Iran	10,358,495	10,330,480	8,329,289	7,607,500	7,657,970	7,200,093	6,548,941
Netherland India: Sumatra	4,662,836	4,490,137	4,114,710	3,759,006	3,535,035	2,999,352	2,492,742
Borneo	1,719,783	1,739,607	1,773,545	1,815,998	1,924,234	2,013,849	2,043,707
Java	933,595	960,125	499,097	464,757	510,320	483,331	515,187
Ceram	81,560	72,139	50,446	41,862	36,738	38,300	41,605
Roumania	6,603,000	7,153,000	8,704,000	8,394,000	8,473,355	7,387,000	7,350,321
Mexico	5,716,423	6,896,657	6,090,842	5,973,955	5,666,857	5,049,109	4,870,175
Iraq	4,345,000	4,126,185	4,079,066	3,724,231	1,048,108	147,943	118,887
Colombia	3,007,935	2,844,251	2,614,092	2,452,635	2,416,432	1,833,606	2,287,835
Trinidad	2,472,943	2,181,676	1,862,796	1,642,446	1,533,122	1,345,532	1,425,009
Argentina	2,432,857	2,330,063	2,202,304	2,036,903	1,997,706	1,950,499	1,871,882
Peru	9,099,885	2,313,691	2,331,454	2,260,903	2,161,990	1,756,867	1,311,856
Bahrein	1,130,734	1,058,557	635,555	173,072	39,008	4,293	123
Burma	1,039,960	1,083,391	1,047,593	991,456	1,004,951	982,233	976,589
Canada	876,016	378,430	190,495	182,820	178,233	144,686	131,937
Brunei	707,123	576,545	470,991	471,842	386,478	290,808	171,432
Great Germany: Old Reich	552,074	453,451	444,589	427,400	317,500	238,600	229,700
Ostmark	63,468	33,010	7,473	6,616	4,172	860	120
Slovakia and Moravia	19,282	17,936	18,665	19,946	25,971	17,776	18,493
Poland	504,678	501,301	510,630	614,760	529,200	550,670	556,680
Japan	356,328	341,040	341,976	326,580	266,520	212,667	239,567
British India	322,125	298,450	273,137	281,072	265,341	224,879	240,767
Ecuador	319,877	306,326	275,293	245,434	231,947	229,578	226,423
Saudi Arabia	66,683	8,070	2,447	Nil	Nil	Nil	Nil
Sarawak	200,126	217,085	221,126	253,799	277,513	315,259	332,819
Egypt	223,058	166,298	177,491	176,436	214,671	232,437	265,055
Italian Empire: Albania	65,313	56,760	32,760	6,152	2,500	1,707	1,375
Italy	13,178	14,000	16,106	15,977	20,180	26,526	27,046
France	72,106	71,008	74,788	74,172	98,025	110,120	105,758
Hungary	42,798	13,910	13	Nil	Nil	Nil	Nil
Bolivia	13,262	15,487	13,197	20,540	19,858	14,085	5,284
Other Countries	34,080	10,000	5,300	4,600	9,100	7,700	10,500
WORLD TOTAL	277,989,582	279,482,814	246,449,340	226,618,486	207,971,753	197,034,849	179,181,741

2 OUTSTANDING PRODUCTS...



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PHOTOGRAPHS BY ROBERT YARNALL RICHIE

Practically all the illustrations in this issue of WORLD PETROLEUM were taken in Venezuela by Robert Yarnall Richie, well-known industrial photographer who specializes in petroleum subjects. In covering this assignment Mr. Richie travelled to South America by plane and spent well over a month visiting practically all the oilfields and many of the wildcat locations in Eastern and Western Venezuela. After concluding his work for WORLD PETROLEUM Mr. Richie spent some time on the Barco Concession in Colombia and travelled over the route of the Petrolea-Covenas pipeline which was just coming into operation at that time. Photographs of the construction of the Oficina-Pto. La Cruz pipeline are published through the courtesy of H. C. Price, work on the line having been completed before Mr. Richie travelled over it. Mr. Richie's work is familiar to readers of WORLD PETROLEUM as his oilfield and refinery photographs have appeared in its pages for a number of years.

Oil Geology of Quiriquire

THE Quiriquire oilfield is located in what the Venezuelan geologists recognize as the Maturin Basin, which is a subdivision of a conspicuous geosyncline and is generally bounded by a line which passes approximately through Guanoco, Aragua de Maturin, San Mateo, Aragua de Barcelona, Pariaguan, Barrancas and Cano Sacupano. These outlines are more or less arbitrary. The surface is covered by Pliocene deposits which obscure the underlying formations and are known almost exclusively from sections penetrated in drilling. Owing to the extensive surface covering, which precludes visual study of the geology of the region, prospecting for oil has been more or less limited to geophysical methods.

The only oilfield of importance so far discovered in the Maturin Basin is the Quiriquire field. It is of a singular type, without any structural closure; the oil is of migratory origin and its source is not definitely established, although by analogy with the Trinidad fields, there is some reason to think that the upper Cretaceous may be an important source.

The stratigraphic column penetrated by wells in this field includes the middle Oligocene, Miocene and Pliocene; each of these divisions is separated from the others by an unconformity. Although formations of Upper Cretaceous age outcrop only three kilometers to the north of the field, no strata of that age have been found in any of the wells.

The Quiriquire formation, which as previously stated belongs to the Pliocene takes its name from the Quiriquire field and includes all the Pliocene in the region which has been named The Llanos by R. A. Liddle.

In general, the Quiriquire formation is tentatively subdivided by J. H. Regan into four principal zones, of which three are based entirely on their economic importance and the other on its persistent geological characteristics. From above downward these zones are (1) Upper zone of heavy oil; (2) a laminated marker bed; (3) the zone of light oil and (4) the lower zone of heavy oil.

The producing strata are lenses which average 25 ft. in thickness and probably do not exceed an average of 20 acres in lateral extension. Vertically, each lens consists of sand of uniform granulation, and there does not appear to be any rule of sequence between one lens and another. The marginal outlines as well as thicknesses are very irregular. Boulder zones are interstratified throughout the formation, but the coarser materials appear to be more predominant near the base. Schlumberger surveys indicate a decrease of porosity from north to south, indicating the direction of flow of the Pliocene Mountain Streams.

MENE GRANDE—16-inch oil line, 100 miles long, built by Mene Grande Oil Co. from Oficina to Guanta in Venezuela. Total of 12,192 joints arc welded in 90 working days with Lincoln Welders and "Fleetweld" Electrodes.

FUERTE—That's the local description of an arc weld. They know that it is STRONGER than the pipe itself. This bull plug is being fabricated on the Barco line in Colombia.

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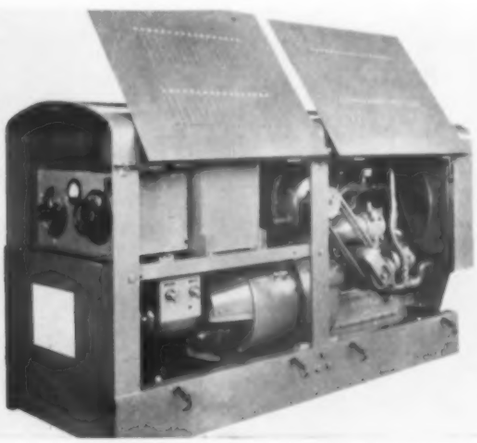
BARCO—270-mile arc welded line of 10-inch and 12-inch pipe built by South American Gulf Oil Company, Barco Concession from Petrolea to Covenas in Colombia by stove pipe method. Note the rugged country. Lincoln welders are shown on the job.

NUEVO—The NEW Diesel *"Shield-Arc"* Welder. Saves up to 40c per hour in fuel cost. Equipped with compact engine type starter, simplifying construction and avoiding battery care and expense.



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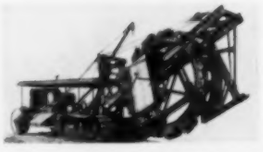

MODEL 49, THE MAINLINER
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OIL'S CONTRIBUTION

(Continued from page 67)

the Orinoco, and it will be seen by a glance at the map that accompanies this issue, how great a territory this road opens up. This importance has long been appreciated and under the administration of General Gomez large sums were spent by the Federal Government in attempts to build such a road. Due to the difficult terrain and frequent floods these attempts were unsuccessful. But when the pipeline was projected all the engineering facilities of the Mene Grande Oil Co. were concentrated on the construction of an all-weather road along the pipeline route, and today cars and trucks travel over this road at 40 or 50 km. per hour. Tomorrow the interior will be shipping cattle, hides and agricultural produce over a highway that will prove of tremendous significance to the nation.

Mene Grande is also engaged on the construction of a 237 km. road from Altagracia to Coro and it is expected that this public work will cost in excess of $800,000.

The Shell companies are working on a project to provide free natural gas to the city of Maracaibo for domestic and, to a limited extent, for industrial consumption. The gas is conveyed in a 12 in. line from the Shell's Concepcion field to a point in the city where gas storage has been erected. Two distribution lines have been laid through the areas of principal consumption. The entire cost of these facilities is being borne by the companies and the gas will be delivered free of charge to the city authorities for distribution.

The road along the entire east side of the Lake was constructed at their own expense by the Lago, Mene Grande and Shell companies, and Shell have now undertaken to construct an extension of this road from Mene Grande to the rich agricultural district of Mototan whence connection with the Trans-Andean highway will be possible.

Lago has spent millions of bolivares on construction and maintenance of roads and bridges, which, of course, become a permanent part of Venezuela's improvements.

Unskilled labor receives Bs. 8.00 ($2.56 U.S.) per eight hour day and perquisites which, it has been estimated, cost the companies approximately Bs. 4.00 ($1.29 U. S.) per worker per day. These wages are well in excess of the minimum stipulated by the Wages and Hours law in the United States. The oil companies voluntarily operated thrift systems by which workers could deposit 10 percent of their income with the company and would receive interest at the rate of six percent per annum on these deposits plus an amount equivalent to 50 percent of the workman's deposit contributed by the company. On separation from the company the deposit, interest and company contribution would be paid to the worker. However, the recently effective profit sharing provision of the labor law under which workers receive up to 16⅔ percent of the payroll may well put an end to the thrift plans as the companies can hardly afford to pay to both funds. Last year it was

(Continued on page 116)

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1 *PHOTOS ON THIS PAGE* show U. S. Rotary Hose at work in Eastern Venezuela's oil fields.

2 *WORLD'S THIRD* leading oil producer, greatest in South America, Venezuela is almost unanimous for U. S. Rotary.

3 *IF IT'S RUBBER,* it's "U.S." that has drilled a majority of Venezuela's more than 4,000 wells.

IT'S MATCHLESS EVERYWHERE! In almost every drilling field in Venezuela, U. S. Matchless Rotary Hose proves its stamina under the punishment of shock pressures, bruising vibrations, and constant flexings.

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4 *HELPING VENEZUELA* produce over 500,000 barrels a day is another of U. S. Rubber's great contributions to the oil industry throughout the world.

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OIL'S CONTRIBUTIONS

(Continued from page 114)

estimated that the companies paid out some $10,000,000 under this provision of the labor law. It has not yet been established that such lump sum payments encourage habits of thrift on the part of workmen, most of the evidence indicating that these payments are dissipated in celebrations that do honor to the munificence of the oil industry but do little to improve the economic status of the workers.

While Government revenue from import duties in 1938 amounted to Bs. 113,000,000 ($35,000,000 U. S. roundly) the revenue derived from oil company taxes and royalty amounted to roundly Bs. 100,000,000 out of a total budget of Bs. 349,834,545 ($110,358,000 U. S.). It should, of course, be borne in mind that a significant part of the customs duties was paid by the oil companies on imported material that the Ministry of Fomento ruled was not exonorable, and that the tax and royalty figures do not include substantial sums paid in stamp and other taxes that are common to all business in Venezuela.

In view of the roads, hospitals, schools, the taxes and royalties, the wages, compensation and profit sharing, it is somewhat startling to listen to a speech by a well informed and successful Venezuelan business man in which he expresses the hope that the oil companies will learn to share more liberally, the riches of the subsoil with the people of Venezuela. In a country where the extraordinarily sound financial condition of the treasury and a large share of the public works program stems directly from the payments made by the oil companies, such a business man may be well informed indeed, but not as regards the part played by the oil industry in the development of his country.

As a by-product of the development of the oil resources of Venezuela, the international oil companies have made great contributions to the health, sanitation, education and public works of that country. An effort has been made in the foregoing article to emphasize the fact that these contributions were dictated by a desire of the companies to operate in a country where the government was stable and orderly, where the people enjoyed a high standard of living and where labor was healthy, efficient and content. In their medical, social welfare and public works the companies have cooperated closely with the present progressive administration of the Federal Government. The results of this cooperation present a happy contrast to the chaotic conditions that prevail, for example, in Mexico, where the administration deliberately chose to cast aside offers of cooperation from the oil companies. In Mexico demands of an impractical administration finally led to the demoralization of the oil industry and the result is that no such program of social welfare, public works and education, no comparable standard of living nor wage scale is enjoyed in Mexico today as is being realized in Venezuela.

TRADE TREATY

(Continued from page 73)

above, the quota limitation holds the expansions of imports to about two percent of domestic production. The President's proclamation establishing quotas insures that the privilege of introducing imports under the reduced rate shall not be usurped by countries which heretofore have shipped only negligible quantities of oil to the United States. Fears that this might happen were voiced by representatives of domestic producers who are opposed to any lowering of the barriers against petroleum imports. To these the answer of Secretary of State Hull has been that the small additional amount of oil that can be admitted under the limitations imposed by the reciprocal trade agreement is inconsequential in comparison with the total production and large exports of the United States and that the treaty will be of great advantage to the country as a whole and to the oil producing states as well through broadening the export market for agricultural and manufactured products.

In announcing the conclusion of the trade agreement the Department of State of the United States issued the following explanatory note in support of its action:

"The United States' share of the known

(Continued on page 118)

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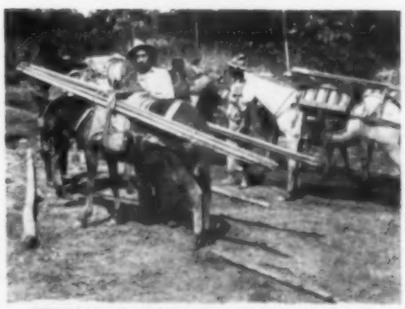

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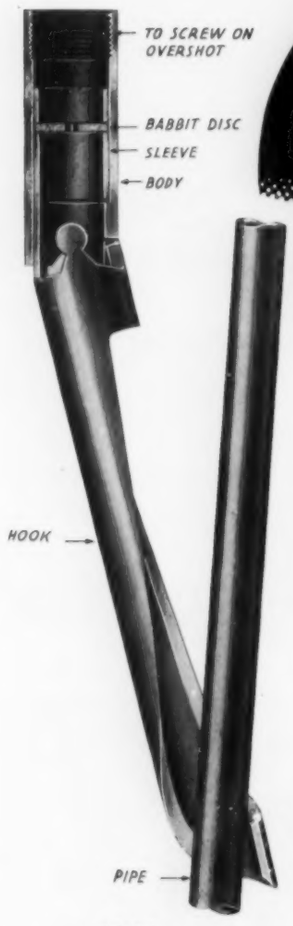

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This wall hook can be used with any type overshot, and operates by slush pump pressure.

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DRILLING EQUIPMENT

(Continued from page 103)

tubing is a satisfactory size then 5½ in. casing may be adequate under certain conditions. If 2½ in. tubing is necessary, then it may be essential that the final casing string set be seven inches in diameter. Where three or 3½ in. tubing is necessary, even larger pipe may be advisable.

It is frequently the case that on an operation in a remote district there is an insufficient supply or quantity of the tools necessary for efficient drilling. For example, drill pipe sizes are frequently reduced to the minimum allowable and insufficient drill collar is used. There may also be inadequate preparation for proper rotating speeds and boiler capacities are generally under those which should be employed. All of these things make for inefficiency in operation, and yet operating costs in Venezuela, and in fact in almost any area distant from the base of supplies, are high. The daily costs are usually greater than those in the United States; therefore, every precaution should be taken that the equipment to be employed on a given job is the best that can be purchased for the purpose. Particular and special consideration should be given to those factors of a drilling operation which go to make for maximum efficiency which are type of bit, rotating speeds, weight on the bit and mud laden fluid character and control.

An equally important factor in drilling efficiency is the training of the personnel to a recognition of the proper values of these various drilling factors and sympathy with their use. With these things we may expect a substantially increased operating and drilling efficiency in both exploratory and proven areas in Venezuela.

TRADE TREATY

(Continued from page 116)

world reserves of crude petroleum is somewhat less than 50 percent. On the other hand, this country produces slightly over 60 percent of the total world output, notwithstanding the fact that the principal domestic fields are being operated under restrictions in order to avoid wasteful production.

"Fuel oil (in one or more grades) is obtained from nearly all grades of crude petroleum and is produced in most refineries. Venezuelan crude is much heavier than the average domestic crude and yields principally heavy fuel oil and asphalt. Domestic crudes yield larger percentages of gasoline and kerosene, and superior grades of lubricating oil, the most valuable petroleum products. Fuel oil from domestic crudes consists chiefly of grades much lighter than imported fuel oil or fuel oil produced in this country from imported crude. The domestic demand for all grades of fuel oil, including both the heavy grades for ships' bunkers and industrial plants and the lighter grades for Diesel engines and residential heating, has been increasing. Production in the United States of heavy fuel oil from low-grade foreign crude and the importation of heavy fuel oil tend to reserve the high-grade domestic crudes for the production of the more valuable petroleum derivatives.

"The United States leads the world in the production and consumption of petroleum products. This country is also important both as an importer and an exporter of crude petroleum and petroleum products. The domestic industry has been on an export basis for many years. In 1938, imports of crude petroleum amounted to 26,048,000 bbl. as compared with exports of 77,272,000 bbl. Imports of fuel oil of all grades (including 18,231,000 bbl. of tax free fuel oil for use in ships' bunkers and 682,000 bbl. entered in bond for manufacture and export) amounted to 26,165,000 bbl. as compared with exports of 43,832,000 bbl. Venezuela is the most important supplier of the United States imports of crude petroleum, accounting for 85 percent of the total in 1937 and 90 percent in 1938. Imports of fuel oil are supplied almost entirely by the Netherlands West Indies, but most of the fuel oil refined in the Netherlands West Indies is produced from Venezuelan crude.

"Imports of crude petroleum and fuel oils for use as ships' supplies are free of duty under paragraph 1733 of the Tariff Act of 1930 and also free of excise tax under Section 3451 of the Internal Revenue Code. Under the trade agreement with the United Kingdom, effective January 1, 1939, the United States bound the tax-exempt status of all liquid derivatives of crude petroleum, including fuel oil, intended for use as ships' supplies. This binding is in substance repeated in the present agreement and extended to include crude petroleum used in this manner."

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(Continued from page 109)

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L. G. Trembley

Among the other active members are George Anderson, Baker Oil Tools Inc.; Carlton Baker Jr., Baker Oil Tools Inc.; Jack Ballagh, Patterson-Ballagh Corp.; L. S. Hamer, Hamer Oil Tools Co., Ltd.; Clay Johnson, Shaffer Tool Works; Floyd Merritt, Elliott Division, Byron Jackson Co.; Harry Morehouse, Wagner-Morehouse; George Ratcliffe, Baroid Sales Co.; L. A. Rawson, Stoddard-Rawson, Inc.; S. R. Robinson, Dowell Service Co.; Walter Seymour, Non-Corrosive Products Co.; B. Reinhold, Abegg & Reinhold Co.; R. E. Gignoux, Hopper Machine Works; Jack Walton, Emsco Derrick & Equipment Co.; L. George Trembley, Howard Supply Co.; Geo. S. MacDonnell, California Oil World; Roy Hitchcock; Clarence Morris, Petroleum Engineer; Allen Hicks, Hydril Co.; M. O. Johnson, M. O. Johnston Oil Field Service, Inc; H. E. Cassidy, The McCarty Co.; D. H. Barnwell, Axelson Mfg. Co.; A. A. Dill, Axelson Mfg. Co.

Wallace Sawdon

M. O. Johnson

J. C. Axelson

Associate members include B. Bronzan, Baash-Ross Tool Co.; Larry Coker, National Supply Co.; Norman Dorn, Lane Wells Co.; Calvin Drake, Hydril Co.; Clarence Hill, Oil Well Supply Co.; Ray Humphries, Axelson Mfg. Co.; Blaine Johnston Jr., M. O. Johnston Oil Field Service Inc.; Tom Martin, Lorraine Corporation; Tom Murphy, Martin-Decker Corporation; Hans Ross, Baash-Ross Tool Co.; Roland Smith, Byron Jackson Co.; Joe Swaton, Kerotest Mfg. Co.; Harold Theroff, Eason-Theroff Tool Co.; Ed. Thompson, Security Engineering Co.; Jack Wilcox, S. R. Bowen Co.; J. B. Shaw, Grant Oil Tool Co.; Knight Templeton, Security Engineering Co.; Earl Atkins, Chiksan Oil Tool Co.; Clyde Ellwood; D. F. Axelson, Axelson Mfg. Co.

H. E. Cassidy

In Houston the Texas No. 1 chapter of the Nomads was organized on September 15. The officers are Rex Hamaker, Reed Roller Bit Co., President; Frank Champion, Byron Jackson Co., Vice President; Wm. V. Gross, Oil Weekly, Secretary-Treasurer; Ray Dud-

A. A. Dill

D. H. Barnwell

J. C. Ballagh

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ley, Gulf Publishing Co., Assistant Secretary-Treasurer; Kenneth Craver, Thornhill-Craver Co., First Sergeant at Arms; Gordon Richmond, Hughes Tool Co., Assistant Sergeant at Arms.

The latest addition to this growing organization is the Nomads club of Tulsa, formed at a meeting held on December 11 when a committee consisting of C. O. Willson, Oil & Gas Journal; W. S. Green, Engineering Laboratories, Inc.; and H. M. Cosgrove, Purchasing Agents' Association of Tulsa, was appointed to draw up by-laws and plans for permanent organization. The closing of the chapter will be the theme of the next meeting.

Members attending the meeting are shown in the group photograph on page 109. Members not present were W. S. Green, Engineering Laboratories, Inc.; G. H. Westby, Seismograph Service Corp.; Harold Cooper, Allis-Chalmers Co.; W. H. Larkin, Larkin Packer Co.; C. F. Dougherty, Larkin Packer Co.; Wm. B. Way, International Petroleum Exposition; Carl White Jr., Franks Mfg. Co.

Members of the Tulsa and Houston clubs have been designated for the honor of heading the entertainment committee for foreign delegates attending the International Petroleum Exposition which is to be held in Tulsa, May 18-25, 1940.

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PIPELINES

(Continued from page 107)

pumping stations at La Paz and La Concepcion, equipped with 14 by 5 by 18 in. steam pumps.

In the V. O. C.'s Bolivar district fields there are no major pipelines owing to the proximity of the wells to the Lake shore, although a large system of gathering lines naturally exists.

The water distribution in these fields presents a special problem due to the virulently corrosive nature of the Lake Maracaibo water which is used for all field purposes. Experiments and research have been carried on for many years to determine the best type of protection for the pipelines against corrosion. Cast-iron has been found to provide a reasonable solution, but more recently a special type of bitumen-lined pipe has been developed and is now widely used.

The Caribbean Petroleum Company's Mene Grande field, which, as explained elsewhere, is inland from the Lake, is connected with the water terminal and refinery at San Lorenzo on the shore of the Lake by two eight inch crude oil lines, each of which is 15 km. in length. They were laid in 1923 and 1927 respectively.

The pumping station for the lines is situated at Mene Grande, and consists of three steam pumps having a total capacity of 9,700 tons per day, the joint line capacities being about 9,600 tons of heavy crude oil or 11,600 tons of light crude oil per day.

Besides the foregoing pumps, there are also two other lines between Mene Grande and San Lorenzo handling gas and fresh water respectively.

PUBLIC WORKS

(Continued from page 70)

revision. Today more serious and precise studies are demanded covering such things as the conditions of potableness of the water at all times, during the dry as well as in the rainy seasons. This factor in particular must be given prime consideration through chemical, physical, and bacteriological analysis. In order to satisfy the demands of modern technique, the Ministry pays for the collaboration of a North American sanitation engineer of recognized ability.

The government also has a contract with another specialist for boring deep water wells, and it has as well, a geological service. The results of this service can well be illustrated by the solutions of the problems of the aqueduct in Maracaibo where 16 deep wells located by Geologist Pedro I. Aguerreverre, 15 kilometers from the city, and drilled by the Martin Engineering Company, have produced a supply of 30,000,000 liters each 24 hours.

The sewerage works in Caracas are executed according to rules and specifications, not

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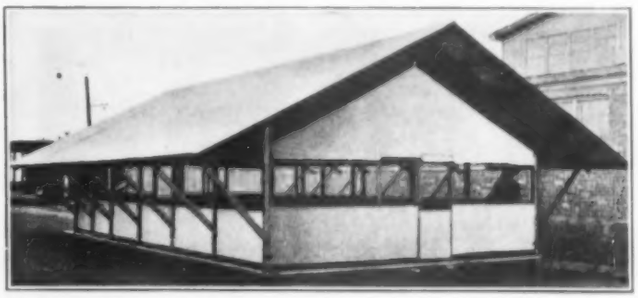
WHEN the oil companies began their operations in South America their emergency housing was a problem. The Tropical Oil Company in 1920 sent an engineer to our factory to help modify the well known Close-To-Nature Canvas House to meet conditions in tropical South America. The result is the "TROCO" type of Canvas House named in acknowledgment of the help given by the Tropical Oil Company. These houses were so well designed for use in the tropics that since their introduction in 1920, they have been shipped to Colombia, Venezuela, Peru, Bolivia, Argentina, Chile, Trinidad, Mexico, Cuba, Central America, South Africa, Asia Minor, India, and the Dutch East Indies. Very recently shipments have been made not only to South America where continual shipments have been made since 1920 of the Troco and Stanco models, but also to the Near East and Far East of both the "CARIB" and the "TROCO" houses.

An 18′ x 35′ "CARIB" Sectional Plywood House

The "CARIB" a Portable, Sectional House built of Resin-bonded, hot plate plywood, complete with wood floor in convenient size sections, joists and sills, canvas awnings, ceiling of a heavy insulation material, corrugated galvanized roofing over regular composition roofed sheathing with air space between. Side walls have wooden shutters sliding in metal channels, which partially or completely close the copper screened wall openings. Illustration shows shutters lowered to permit free ventilation. Can be furnished with conventional type glass windows. Fully fabricated in our plant, sections are bolted together in the field. All bolts and nuts are rustless. The "CARIB" is designed 100 percent Portable—can be erected and taken down many times. In many sizes, from 8′ x 8′ to 18′ x 40′, in from one to five rooms and bath. The above house is No. G-18, size 18′ x 36′, having five rooms, bath, closet and hall, and weighs approximately 12,500 lbs. packed for export. No experienced labor required to erect the "CARIB" in the field, all parts and sections being numbered and all houses shipped complete with blue prints and detailed assembly directions.

"TROCO" Type:—This picture of an 18 x 36 foot size of the well known Close - To-Nature Canvas House with a super framework carrying an upper roof illustrates the "Troco" model in use since 1920 in the oil fields of many parts of the world. The upper roof is corrugated steel sheets (it may be canvas) and is two feet above the canvas roof and projects at the eaves five feet and gables three feet, thus protecting the house proper from storms. Canvas is heavy waterproof khaki. The copper screened openings may be closed weathertight or partly so by canvas shutters operating in steel grooves. The house is practically 100 percent portable. The canvas on walls and shutters is permanently attached in our factory and rolls up into convenient bundles for handling. The roof and gables are a hood that pulls on over rafters. Frame parts articulate by means of wing nuts and slots. Hence the house is easily set up or taken down. All bolts and nuts rustless. Floors made up in sections. Every house set up in our factory and all parts numbered so it is easily erected on location.



An 18′ x 36′ "TROCO" Portable Canvas House

The MONROE Company, successors to the "Close-To-Nature" Company, established in 1908 by the Monroes, are among the oldest portable house builders in America. The perfecting in recent years of Resin-bonded Plywood lumber thus rendering it waterproof, has greatly simplified the construction of wooden sectional houses. The Monroe line of "Carib" plywood houses added to their old lines of "Troco" and "Stanco" Canvas Houses allows a choice for housing more or less permanent in tropical and semi-tropical countries.

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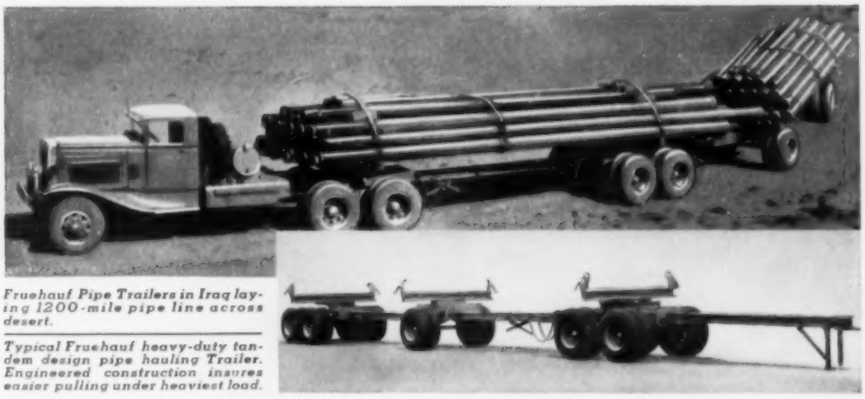

Fruehauf Pipe Trailers in Iraq laying 1200-mile pipe line across desert.

Typical Fruehauf heavy-duty tandem design pipe hauling Trailer. Engineered construction insures easier pulling under heaviest load.

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copied from books or foreign systems, but adapted to the locality and its customs. With patience and technique, in spite of the ungratefulness of the medium, a reduction of 40 percent in the costs per unit of work was accomplished in 1938. The difference between the amounts estimated in the budgets, and those for materials actually used, is not more than five percent higher or lower. The Ministry has been able, thanks to the collaboration of the Sewerage Division, to award contracts for the various works, through a system of public bids.

Sewerage works have been undertaken in Ciudad Ojeda (already finished), in Valencia, Barquisimeto, Maracaibo, Puerto Cabello, Valera, and San Fernando de Apure. The system of separate canals is used, and the works are being executed by persons who were found by the Ministry to be the most satisfactory bidders for each particular project.

Hydraulic Works Undertaken From 1936 to 1939

	In Service	Under Construction	To be started	Being studied
Aqueducts	15	43	9	20
Sanitary Works	9	7	5	12
Town Defense Works		3		4
Irrigation Works	1	2	1	3

At present, the Ministry has under study and is simultaneously carrying out some irrigation works in the valleys of the Tuy, where an extension of from 3,000 to 4,000 hectares will be covered. Other irrigation projects in the vicinity of Lake Valencia (*Laguna de Valencia*) are also being studied to help agricultural labors. The Ministry has been considering lately the possibility of irrigation in San Carlos de Cojedes, and in Guanare (from 6,000 to 7,000 hectares in the first and about 1,000 in the second).

Space does not permit a complete description of the activities of the Ministry in connection with building construction. The Ministry possesses and can depend on a well organized force of collaborators, who in accordance with the various dependencies, are endeavouring to establish technical specifications which may serve as a pattern for all the Republic.

Already in service are: the New Ministry of National Education; the Museums of Art and Sciences; the *Instituto Pedagógico;* the new building of the National Library; the Venezuela Experimental School; La Victoria Normal School for Women; the Kindergarten at San Cristobal; the *Establo Cuarentenario de Turiamo;* the Naval School at Maiquetia (one department); and the *Cuartel Capitolio* at Ciudad Bolivar.

Practically finished are the works of the Antitubercular Popular Sanatorium (*Sanatorio Popular Antituberculoso);* the Maracay Civil Hospital; the *Acosta Ortiz* Hospital at San Fernando de Apure; A Vigilance Post in Cojoro; the new soldier barracks in San Fernando; the soldier barracks at San Antonio del Táchira; and, in Caracas, the new jail; the National Stadium; the school *Gran Colombia;* and the infantry quarters *General Rafael Urdaneta.*

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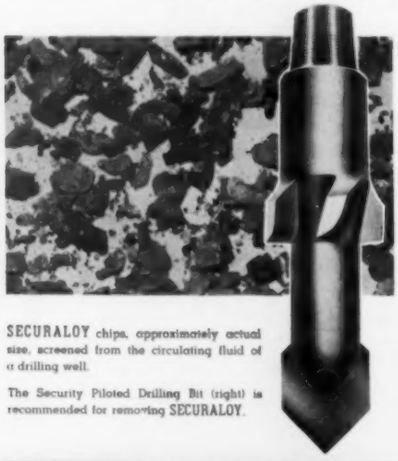
• A more complete list of Security Drillable Tools and Accessories will gladly be supplied on request.



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Ministry of Agriculture the agricultural farms of Caripe and Cumanacoá, and is now erecting the laboratory of veterinary bacteriology and parasitology, a zootecnic station at El Pao (*Anzoátagui*)and 10 *Aguadas* in various places.

I have not included in this summary, several other activities of the Ministry, each of considerable individual importance, such as the works in *Cartografía Nacional*, now a division of the Ministry of Public Works, and the special services in connection with education and medical assistance to workers. The photogrametric services of the Ministry have achieved a perfection which is striking in South America, and those on behalf of the education of laborers have succeeded, among other things, in having more than 1,000 students registered last year in the electoral census.

OBRAS PUBLICAS

(Continue de la página 71)

que habrán de servir de norma en toda la república.

Estan ya en servicio el nuevo Ministerio de Educación Nacional, los Museos de Bellas Artes y de Ciencias, el Instituto Pedagógico, el nuevo edificio de la Biblioteca Nacional, la Escuela Experimental Venezuela, la Normal de Mujeres de La Victoria, el Kindergarten de San Cristóbal, el Establo Cuarentenario de Turiamo, la Escuela Naval de Maiquetía (un departamento) y el Cuartel Capitolio de Ciudad Bolivar.

Practicamente terminados están los trabajos del Sanatorio Popular Antituberculoso, uno de los edificios para el Leprocomio de Anare, el Hospital Civil de Maracay, el Hospital "Acosta Ortiz" de San Fernando de Apure, un Puesto de Vigilancia en Cojoro, el nuevo Cuartel de San Fernando, el Cuartel de San Antonio del Táchira y en Caracas la Nueva Cárcel, el Estadio Nacional, la Escuela "Gran Colombia" y el Cuartel de Infanteria "General Rafael Urdaneta".

Para el Ministerio de Agricultura construyó el de Obras Públicas las Granjas Agrícolas de Caripe y Cumanacóa y actualmente erige el Laboratorio de Bacteriología y Parasitología Veterinaria, una Estación de Zootecnia en El Pao (Anzoátegui) y 10 Aguadas en sitios diversos.

No se incluyen en ninguna de las que acabo de hablar otras labores del Despacho, tambien muy importantes en su género. Tales son los trabajos de la Cartografía Nacional, adscrita hoy al Ministerio de Obras Públicas como una de sus Direcciones y sendos servicios especiales de educación y asistencia médica de los obreros. Los trabajos fotogramétricos de nuestra cartografía adquieren una perfección resaltante en Sur América y los de Educación Obrera han logrado entre otros éxitos que más de mil alumnos pudieran inscribirse durante el último año en el Censo Electoral.

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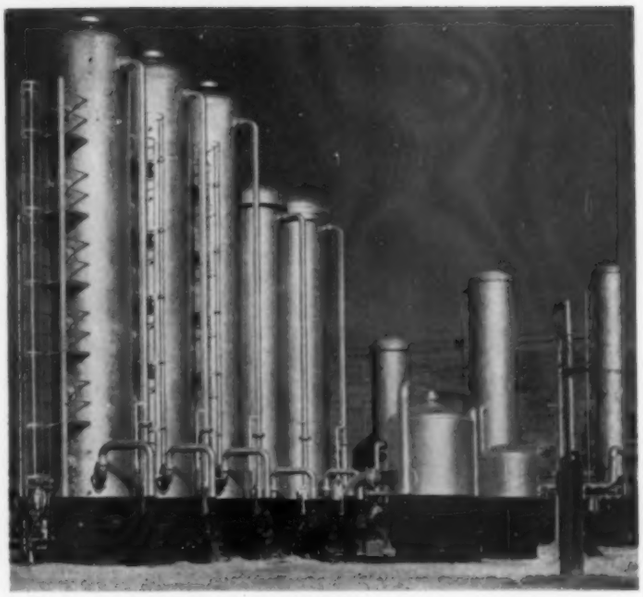

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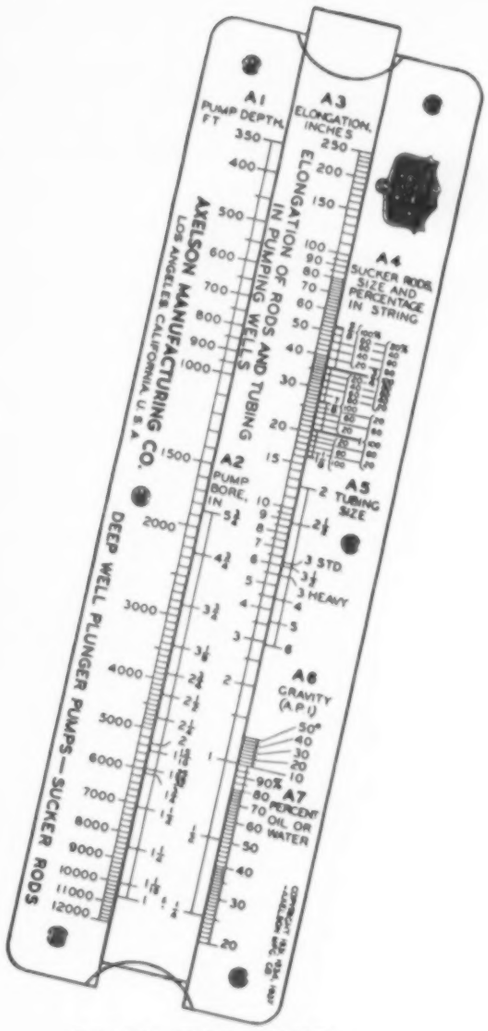

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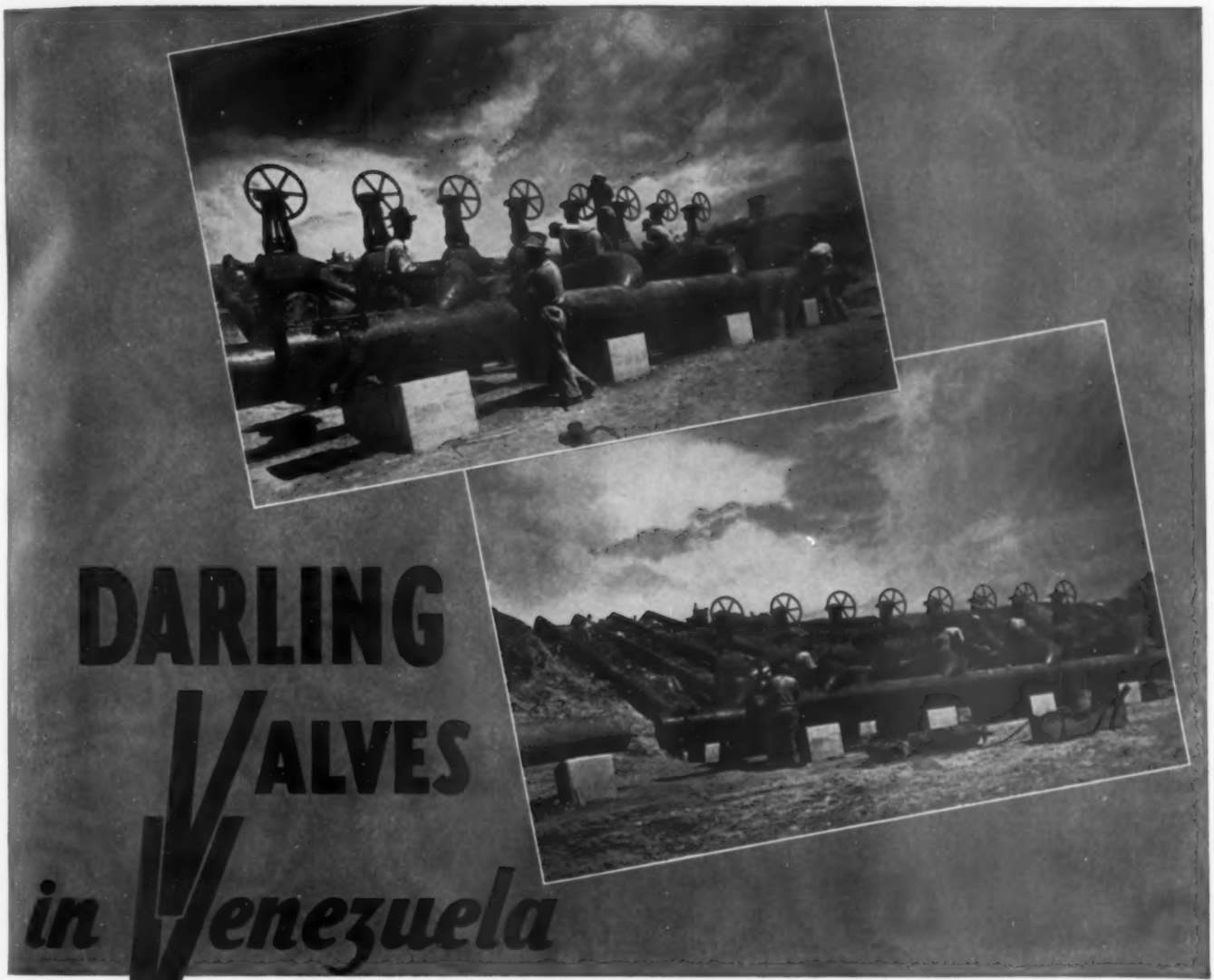

The outstanding installation by the Mene Grande Oil Company, illustrated above, is but one example of the increasing use of Darling Valves throughout the world's great oil fields.

For many years, Darling has specialized in producing Iron Body and Cast Steel Body Valves in the larger sizes for the oil industry.

DARLING

VALVE & MANUFACTURING COMPANY

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Representatives in:

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UNIBOLT flexible BALL JOINT
ADDS LIFE AND FLEXIBILITY TO ROTARY HOSE
The UNIBOLT Flexible Ball Joint is now available with hubs threaded male by female in 3" and 4" sizes for rotary hose connections as illustrated herewith. This Joint swings 45 degrees, thus relieving the rotary hose of strain which results from rigid connections.
For boiler and pump manifolds, high pressure steam lines and all lines subject to expansion or vibration, the standard UNIBOLT Ball Joint with two female threaded connections is preferred. It simplifies misaligned connections, prevents damage caused by intermittent vibration and is ideal for flexible manifolds.
The UNIBOLT Ball Joint has no threads between its component parts to gall or freeze; therefore, it is easily repacked. A single bolt tightens the joint.
THORNHILL-CRAVER CO., INC.
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OIL WELL DRILLING MACHINERY

TRADE HECLA 127 MARK

STEEL

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Fish Tail Bits for rotary drilling, core barrel cutter heads, etc.

TRADE ERA MARK
H.R.

HEAT-RESISTING STEEL

For Tubes, Tube Supports, Hangers, Spacers and other parts subjected to high temperatures.

To Counteract Wear

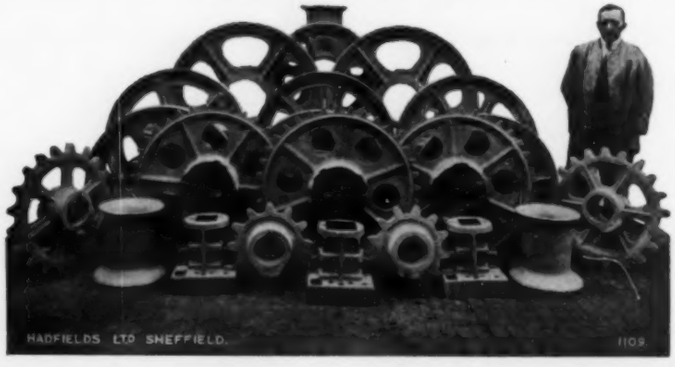
SPROCKET WHEELS, PULLEYS, ROLLERS

and other parts of Oil Well Drilling Machinery should be made in

HADFIELD'S PATENT ERA MANGANESE STEEL

Trade Mark

which is unequalled for resisting the wear and abrasive action of sand and other abrasive substances.



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STEEL

For Plant and Components used at intermediate temperatures. Not subject to temper or corrosion brittleness.

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NON-CORRODING STEEL for Thermowells. Highly resistant to the attack of numerous chemical agents.

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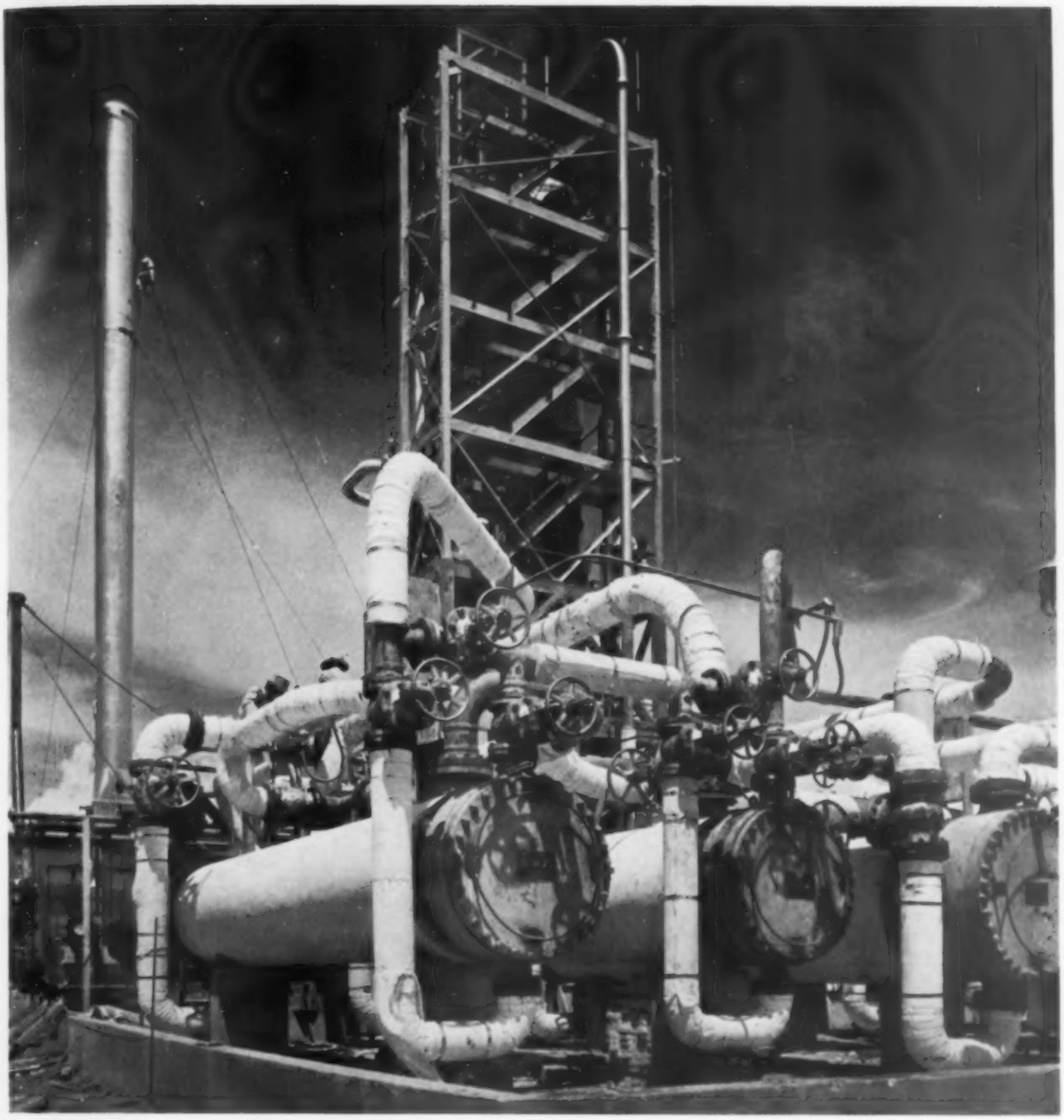

10,000 bbl. per day general utility refining unit complete with modern heat recovery equipment and modern controls.

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The performance of this unit in Venezuela has exceeded the guarantees in both quantity and quality.

This is characteristic of Foster Wheeler refinery installations throughout the world.

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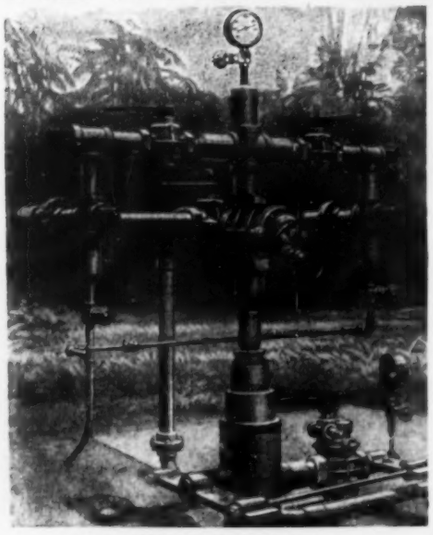
NEWMAN-MILLIKEN GLANDLESS LUBRICATED PLUG VALVES

FOR PRESSURES RANGING FROM VACUUM TO 3,000lbs. per square inch.

UNIQUE FEATURES:—

- PARALLEL PLUG—ALWAYS IN CLOSE WORKING CONTACT WITH ITS BODY SEATING, NO GRIT CAN THEREFORE GET BETWEEN THESE TWO SURFACES.
- NO GLAND—NO PACKING—NO GASKETS.
- SELF SEALING.
- VISUAL CHECK ON FULL LUBRICATION.
- PORT OPENINGS EQUAL TO FULL SIZE PIPE AREA.
- OPENED AND CLOSED BY QUARTER TURN OF PLUG.

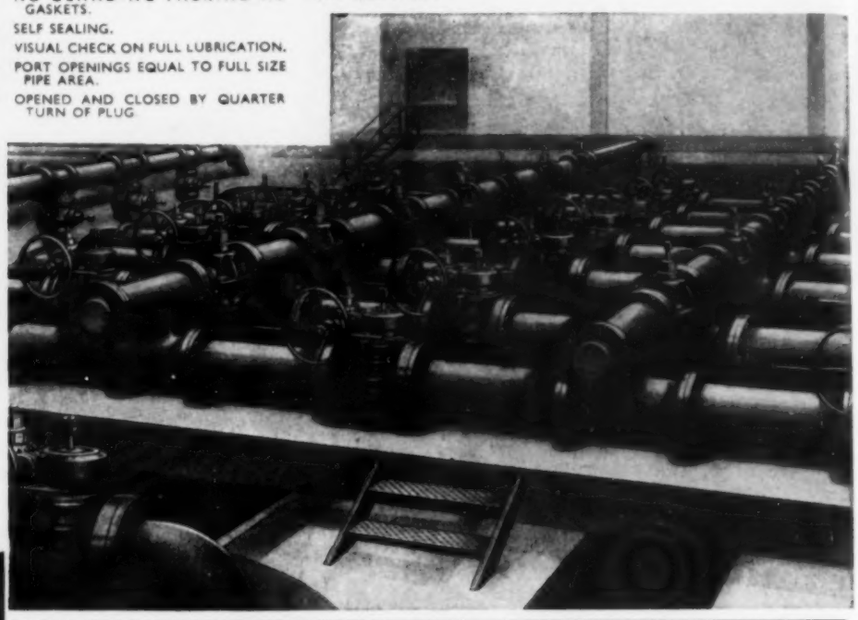


NEWMAN-MILLIKEN VALVES ON A CHRISTMAS TREE.

SOLE LICENSEES THROUGHOUT THE WORLD WITH THE EXCEPTION OF THE U.S.A.

Newman, Hender & Co. Ltd

WOODCHESTER NH CLOS ENGLAND



INSTALLATION SHOWING NEWMAN-MILLIKEN VALVES ON HORIZONTAL MANIFOLD

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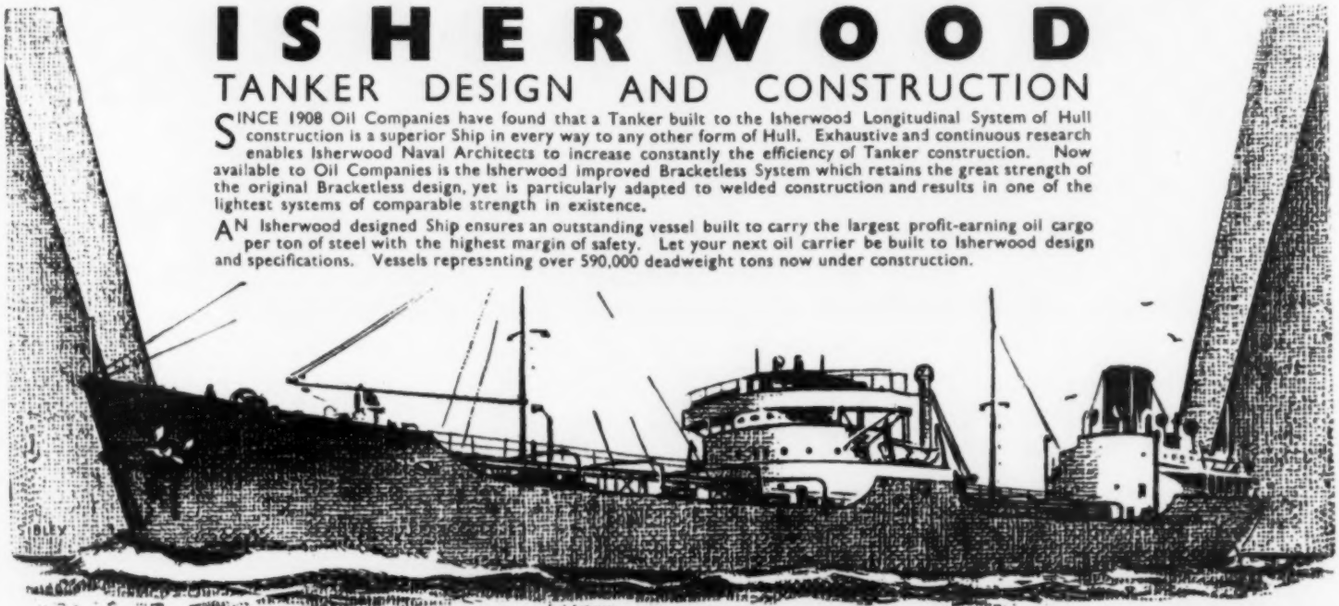
TANKER DESIGN AND CONSTRUCTION

SINCE 1908 Oil Companies have found that a Tanker built to the Isherwood Longitudinal System of Hull construction is a superior Ship in every way to any other form of Hull. Exhaustive and continuous research enables Isherwood Naval Architects to increase constantly the efficiency of Tanker construction. Now available to Oil Companies is the Isherwood improved Bracketless System which retains the great strength of the original Bracketless design, yet is particularly adapted to welded construction and results in one of the lightest systems of comparable strength in existence.

AN Isherwood designed Ship ensures an outstanding vessel built to carry the largest profit-earning oil cargo per ton of steel with the highest margin of safety. Let your next oil carrier be built to Isherwood design and specifications. Vessels representing over 590,000 deadweight tons now under construction.



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Crossley-Premier Diesel Engines have been installed by many important undertakings. Their main features are robust construction for continuous duty, low fuel and lubricating oil consumption, easy accessibility, excellent balance and high overall efficiency.

Members of the Diesel Engine Users' Association recently paid a visit to the Middle Level, St. Germans Pumping-Drainage Station, where three 1,000 B.H.P. Crossley-Premier 8-cylinder vis-a-vis Diesel engines have been in operation for five years. Each engine is coupled to a centrifugal pump capable of discharging at the rate of 850 tons of water per minute. The three units are capable of discharging from the level nearly one thousand million gallons of water per day.

Write for a copy of Crossley Chronicles No. 106.

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VIS-A-VIS *Diesel Engines*

Made in various sizes up to 3,000 B.H.P.

CROSSLEY-PREMIER ENGINES LTD., SANDIACRE Near NOTTINGHAM

CROSSLEY POWER MEANS CHEAPER POWER

P. 40

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Refraction and Reflection of Seismic Waves—II. Discussion of the Physics of Refraction Prospecting — *C. H. Dix*

Seismic Paths, Assuming a Parabolic Increase of Velocity with Depth — *Charles E. Houston*

An Areal Plan of Mapping Subsurface Structure by Refraction Shooting — *L. W. Gardner*

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A Note on the Relation of Suddenly Applied DC Earth Transients to Pulse Response Transients — *G. E. White*

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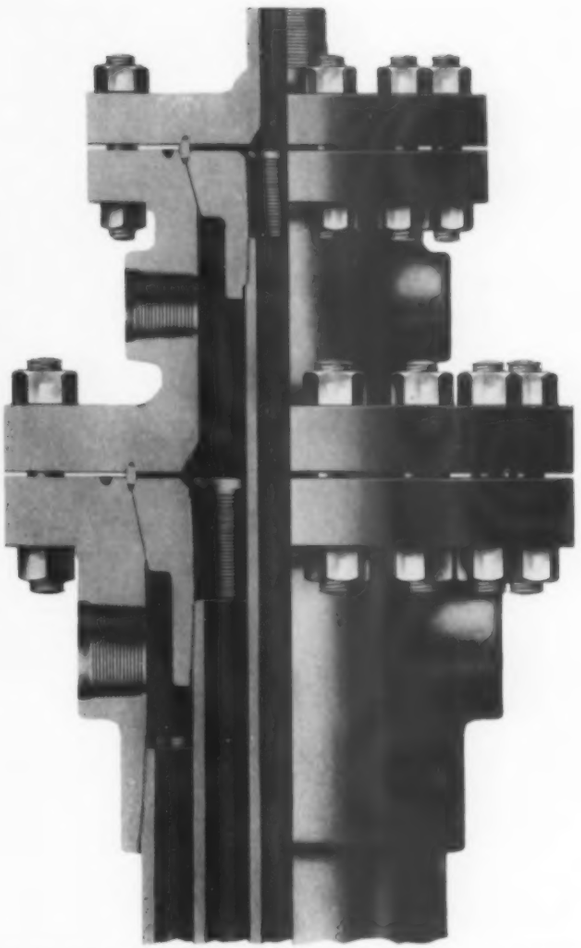

HANG YOUR PIPE PROBLEMS

On this Mandrel Type

RECTORHEAD

This RECTORHEAD, Mandrel Type, casing head and tubing head (9-M, 6000 lb. test . . . and 6-M, 4000 lb. test) is winning world-wide acceptance through valuable exclusive features it offers. Note the *single seal ring* which acts dually as a perfect pressure sealing medium and a mandrel hold-down. Note the standard A.P.I. bolt sizes and lengths, and A.P.I. flange thicknesses. The mandrel design and packing ring position makes it impossible to "wedge" the mandrel in the hanger. . . . an advantage practical operators truly appreciate.

This Mandrel Type RECTORHEAD gives you a casing and tubing suspension . . . in combination (flanged) or singly, as specified. It is simple in design, easy to install, is safe, and dependable. The mandrel is furnished either threaded, or for welding, as ordered.

The RECTORHEAD line, including the Slip Suspension Type and the exclusive Split Ring—Recessed Coupling Type, now offers the trade a proven head to meet all three methods of pipe suspension. Write for catalog giving details and prices on all of them.

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EXPORT:
LUCEY EXPORT CORPORATION
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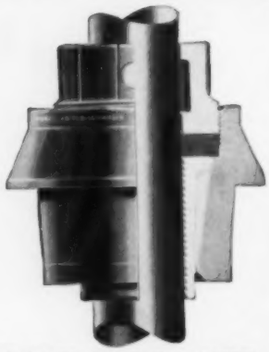
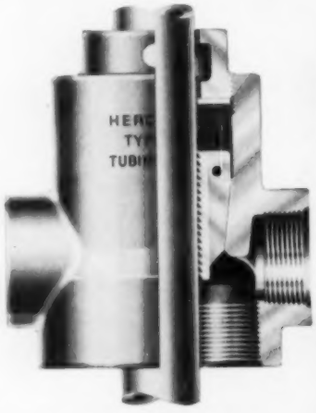
SPEED PRODUCTION IN SOUTH AMERICA

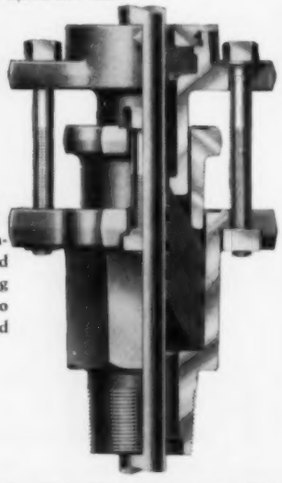
with *best* equipment

HERCULES "OVERHEAD-PACKED" TUBING HANGER, for use in Berry-pattern casing heads, packs off successfully under ordinary pressures. 3 slips encircle tubing eliminating crushing. Packing *above* slips is compressed by packing ring and gives a tight seal.





HERCULES TYPE D-4 "OVERHEAD-PACKED" TUBING HEAD, a combination tubing support and casing head, accommodates any size tubing from 3" upset down to 2" or smaller, by changing parts. Tubing can be run through the head. Height over-all, 12", 2,500-lbs. test.



HERCULES DUPLEX POLISH-ROD STUFFING BOX is far superior to conventional types. Special cone-shaped packing has long life and super-packing qualities. On tests this box has run 4 to 6 months without changing packing and with very little tightening of glands.

HERCULES "OVERHEAD-PACKED" CASING HEADS have slips for supporting the inside string of casing, with packing *above* the slips. Type B, here shown, is forged steel, for pressures up to 7,000 lbs. Type A is cast steel, for pressures up to 3,000 lbs.

For full particulars communicate with our export representative, Lloyd G. Ensign, 30 Rockefeller Plaza, New York, or with his representatives in Latin America, Wm. H. Kennedy & Co., Trinidad, B.W.I.

HERCULES TOOL COMPANY

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TOOL COMPANY
Oil Well Specialties

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Business *begins with* BUYING

by Westinghouse

• A *manufacturer* must buy before he can sell. He must buy the raw stuff that goes to make the finished product; he must buy machinery and the plants to house it, and must hire the men without whom the finest equipment in the world would be just so much worthless scrap.

• *In our particular case,* being a large manufacturer, we are first of all an enormous buyer. If all of the copper wire we buy in a single good year were converted into sixteenth-inch wire, the strand would stretch over 209,000 miles—enough to wind eight times around the Earth. And the insulating yarn we buy could be looped 36 times from Earth to Moon.

• We *use* enough steel and iron each good year to build two railroad tracks 2,290 miles long —or a couple of Oakland Bay Bridges.

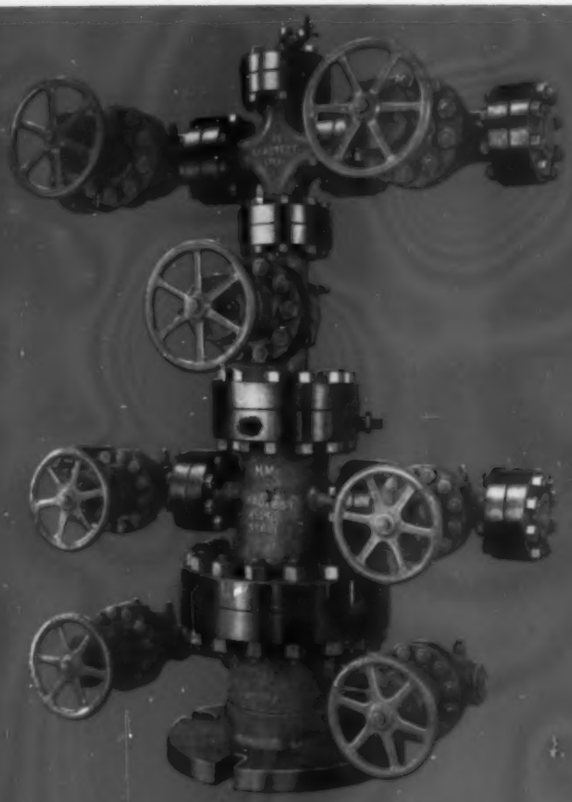
• We *buy a lot* of gas, oil, hydrogen, nitrogen and oxygen; we are a huge consumer of gold, silver, mercury and tungsten. You won't find the kind of sapphires we use for bearings in a jewelry store—nor would you find a jewelry store in the world that could supply the 20,000,000 jewels we need each year. We even buy diamonds and use them as dies for drawing very fine wire. Though most of our purchases run into tremendous quantities, one of them, last year, amounted to just one ten-thousandths of a gram. That was radium, and it cost $300.

• *Every one* of the forty-eight states and Alaska are important suppliers of ours. Twenty foreign countries contribute materials not produced in America. Almost literally, every industry and every farm produces something that we use.

• "*What in the world* can a farm grow for Westinghouse?", you ask. Just to name a few things — oat hulls, molasses, grain and sugar cane for alcohol, dextrine from corn, flour and straw for making foundry cores, lard, sugar, lumber and tapioca; also leather, wool, cotton and meat products. It all adds up to this. Each year we buy more than $100,000,000 worth of the products of industry and farmers. Some of our people have estimated that these purchases give work to about 36,000 persons annually. This is in addition to our own 43,000 employees who fabricate these materials into a vast number of machines and appliances which increase the permanent wealth of America.

• *Who* gets this wealth? Why, the industries and farmers who sold the materials to us, of course. It's really nothing but an elaborate process of swapping. We swap what we make for the materials needed to make our products.

• *That's why* we cannot consider ourselves as a separate industry. Along with thousands of others, we are merely an essential cog in the tremendous process which has created American prosperity and the American way of living.



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PERFECT CONTROL
ABSOLUTE SAFETY
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KEROTEST

SYSTEMS OF WELL CONTROL

(LICENSED UNDER PATENTS OF GRAY TOOL COMPANY)

A TYPICAL example of Kerotest engineering follow through is this permanent hookup or flowing manifold recently completed for a well in far off Venezuela, South America. Every feature and detail of this highly perfected Kerotest well control system was laid out by our engineers and developed to meet the individual operating conditions and casing program of this well.

It illustrates the complete well control service you have available through Kerotest from spudding in to final production. With Kerotest you know definitely that you are protected every moment of the time during the entire drilling operation, yet no expensive blow-out preventers or drilling valves are tied up permanently on your producing wells. It's the simplest, strongest, most flexible control ever introduced to the oil fields.

If you are not familiar with this outstanding development, just fill in the coupon at the bottom of the page, and we will gladly send you an illustrated brochure of vital interest to every oil operator.

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Please send the undersigned copy of your booklet covering KEROTEST Systems of Well Control.

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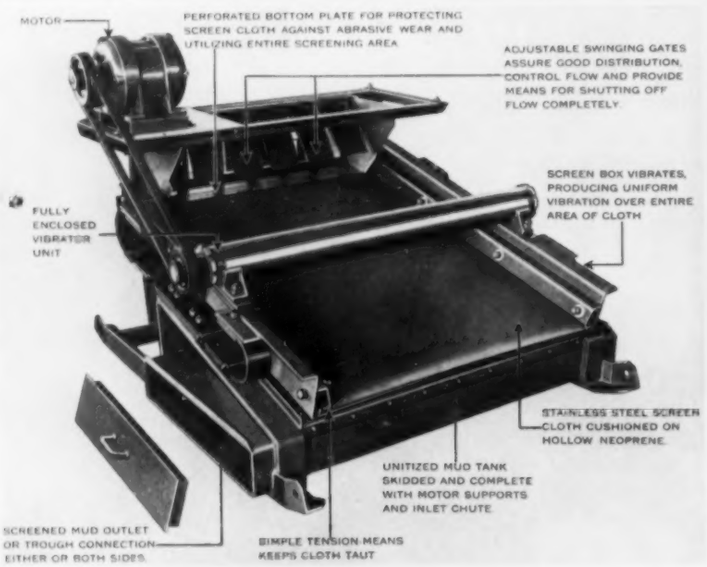
As Throughout the World

LINK-BELT

MUD SCREENS and ROTARY CHAINS


MOTOR
PERFORATED BOTTOM PLATE FOR PROTECTING SCREEN CLOTH AGAINST ABRASIVE WEAR AND UTILIZING ENTIRE SCREENING AREA
ADJUSTABLE SWINGING GATES ASSURE GOOD DISTRIBUTION, CONTROL FLOW AND PROVIDE MEANS FOR SHUTTING OFF FLOW COMPLETELY.
SCREEN BOX VIBRATES, PRODUCING UNIFORM VIBRATION OVER ENTIRE AREA OF CLOTH
FULLY ENCLOSED VIBRATOR UNIT
STAINLESS STEEL SCREEN CLOTH CUSHIONED ON HOLLOW NEOPRENE.
UNITIZED MUD TANK SKIDDED AND COMPLETE WITH MOTOR SUPPORTS AND INLET CHUTE.
SCREENED MUD OUTLET OR TROUGH CONNECTION EITHER OR BOTH SIDES.
SIMPLE TENSION MEANS KEEPS CLOTH TAUT

Link-Belt Vibrating Screen For Reconditioning Rotary Mud

Drillers everywhere know from long experience, that the Link-Belt screen offers the most efficient, dependable and economical method of reconditioning rotary mud.

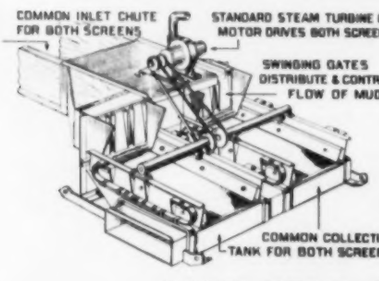
That's why you'll find Link-Belt screens on a majority of today's drilling jobs.

Their many exclusive features, some of which are indicated above, have definitely demonstrated advantages such as lower cost operation, better conditioning of mud and longer life.

Made in two sizes—48″ x 60″ and 24″ x 48″ screening areas, for shallow, medium and deep well drilling. The small size unit has handled the discharge from a pump as large as 7¼″ x 20″ under normal conditions.

DUAL HOOK-UP OF SMALL-SIZE SCREENS

With the arrangement illustrated here, the two screen panels are vibrated independently of each other. Either screen can be thrown out of service by closing the inlet gates. If the volume of mud is small enough for one screen to handle, a saving can be made by cutting the other screen out of service. In addition to providing a standby unit for emergency service, such an arrangement will give greater capacity than a single screen of double the width, although overall dimensions are not much greater and the headroom required is less. A single 2-HP standard motor will drive both screens on this dual hook-up. Other advantages are greater life for the unit and the ability to use a finer mesh screen cloth with less likelihood of breakage. Let us send you further information.


COMMON INLET CHUTE FOR BOTH SCREENS
STANDARD STEAM TURBINE OR MOTOR DRIVES BOTH SCREENS
SWINGING GATES DISTRIBUTE & CONTROL FLOW OF MUD
COMMON COLLECTING TANK FOR BOTH SCREENS

LINK-BELT COMPANY

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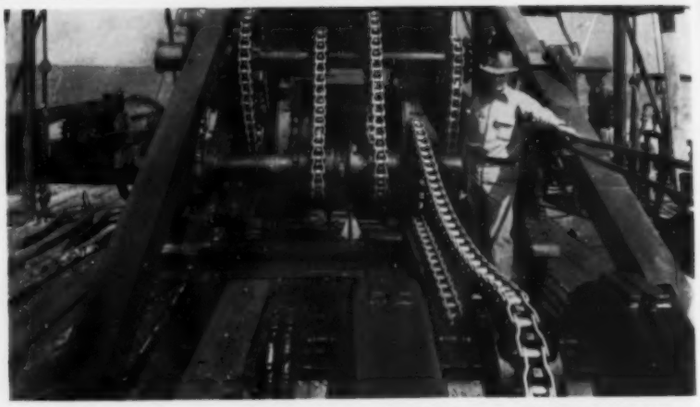


Link-Belt Rotary Chains for Every Drilling Job

● For quicker, safer, lower cost drilling to that producing horizon, operators have come to depend on Link-Belt Chains, of which there is a type to meet every depth and load condition.

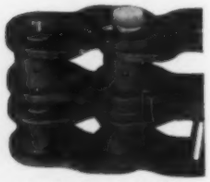
SS-124 (API-4)

SS-3125 Hyper, Single

SS-124 Three Bar Hyper (API-4)

API-3 Red-Hed

API-4 Red-Hed


SS-3125 Hyper, Double

SS-40 Hyper (API-3)

SS-124 Two Bar Hyper (API-4)

Silverlink Finished Steel Roller Chain for drilling, servicing and pumping equipment.

SPECIFICATIONS OF LINK-BELT ROTARY CHAINS:

Link-Belt Chain Number	Pitch Inches	Ap. prox. Links In 10 Ft.	Ultimate Strength, Pounds	Net Wt. Per Foot, Lbs.	Packed for Export Per 100 Feet: Approx. Gross Wt., Lbs.	Packed for Export Per 100 Feet: Approx. Cubic Feet
SS-40	3.075	39	28,000	6.9	765	9
API-3 Red-Hed	3.075	39	50,000	7.5	765	9
API-4 Red-Hed	4.063	30	112,000	15.8	1,710	18
SS-40 Hyper	3.075	39	75,000	8.3	915	9
SS-124 Two Bar Hyper	4.063	30	130,000	16.1	1,760	18
SS-124 Three Bar Hyper	4.063	30	170,000	16.3	1,780	18
Super Hyper	4.063	30	175,000	17.8	1,930	18
SS-3125 Hyper, Single	3.125	39	115,000	12.5	1,450	15
SS-3125 Hyper, Double	3.125	39	230,000	24.6	2,700	30

In VENEZUELA *and every oil country*

MISSION ROLLING DOG SLIPS
in
VENEZUELA

Mission Slips get the preference **the world over** because the unique Mission "Rolling Dog" principle assures: **positive grip** and **instant release.**

MISSION
PRODUCTS ARE:

- **SAVING MONEY** for oil companies
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Mission Slush Pump Valves
Mission Slush Pump and Boiler Feed Pistons
Mission Self-Sealing Gland Packings
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. . . always at your command
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"IF A PRODUCT DESIGNED BY MISSION IS NOT PROVEN *Superior* MISSION WILL NOT PRODUCE IT"

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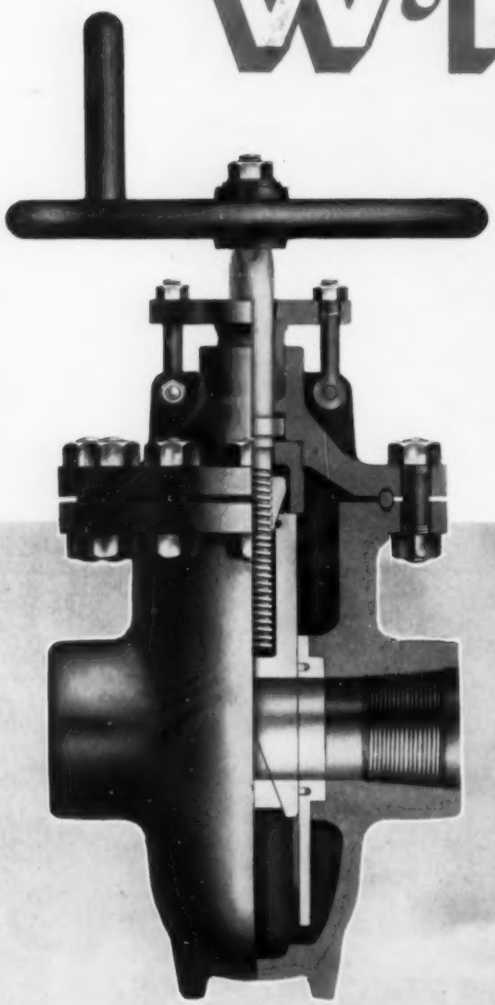
• SLIPS • VALVES • PISTONS • PISTON RODS • SWABS

W-K-M Gate Valves

WILL SOLVE YOUR PROBLEMS, TOO!

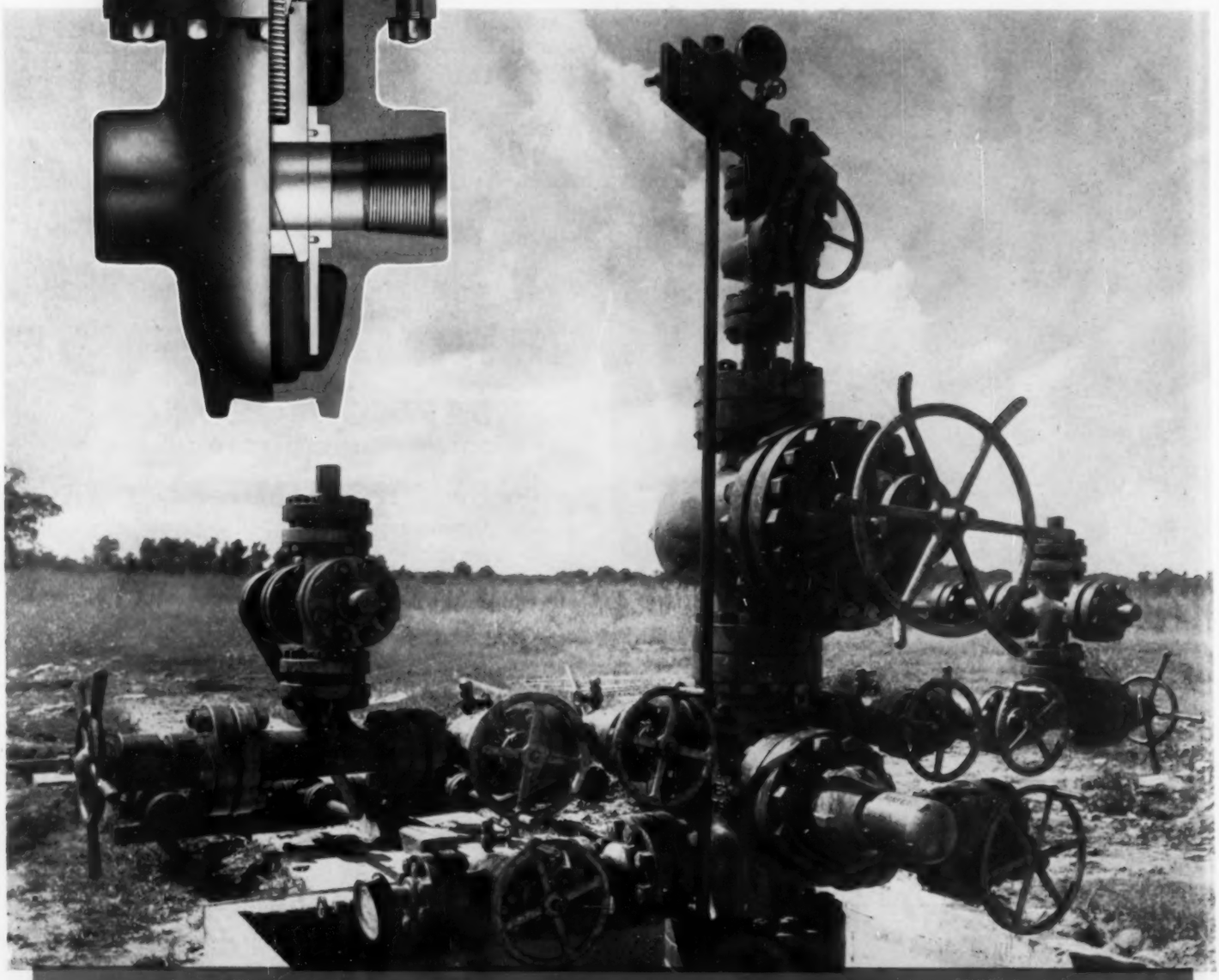


Just as W-K-M Gate Valves are eliminating valve troubles throughout the fields of the world, they will solve your valve problems, too. No other valve can offer you the smooth, through-conduit opening by means of which there are no obstructions or pockets in either open or closed positions . . . seats not exposed to abrasion nor wear . . . pressure confined to the flow-way, enabling the body and bonnet to serve as a reservoir for sufficient lubricant to last over a long period.

This field picture shows an all W-K-M Gate Valve Christmas-tree hook-up in the deepest, highest pressure field in the Gulf Coast, where W-K-M's are standard gate valve equipment. They are available in all pressure requirements . . . 800 lbs. test to 10,000 lbs. test.

Now available . . . W-K-M Gate Valves of special design to meet your particular hook-up requirements . . . or special trim for high temperatures or corrosive conditions.

W-K-M Gate Valve Catalog carries full details. Write *today* for your copy.



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Major operator, drilling in Peru, says . . . .

"WHAT HAD BEEN NEEDED WAS SOME 16 IN. CRUMS"..

For drilling "The Hardest Surface Hole His Outfit Had Ever Made!"

Th… was worn out quickly and going … was tough with only the fishtails to make … hole. The reaming was hard and it was decided that on the next job there would be plenty of bits. After the pipe was set it didn't matter; the crew had good bits and the formation cuts with rock bits. What had been needed was some 16 in. Crums. Mr. _____ said that it was the hardest surface hole his outfit had ever made, with the possible exception of Jacalitos Canon—and he's had plenty of experience.

When Mr. _____ left Peru, the returns were getting warm as though approaching something hot in the ground. The vicinity is called Aqua Caliente after the hotwater springs which occur around the perimeter fo…

This excerpt is from an article by a major operator, telling about his experience in opening a new field in Peru. It appeared on page 34 of the November, 1938, issue of "World Petroleum."

When we say Crum-Brainard Rock Bits OUTPERFORM we mean just that. In major oil fields throughout the world these bits are making new friends and keeping old ones with performance records that are outstanding. They drill faster. They drill straighter. They stay in the hole longer. All the way through they are HONEST BIT VALUE. Try them on your current drilling job and see for yourself why operators are so enthusiastic about them!

Crum-Brainard Roller Bits are made in four types to meet the drilling conditions encountered in all types of formations. Types "C", "CF", made in 7" to 20" sizes, have short teeth and sharply tapered cutters for maximum efficiency in abrasive formations. Types, "O," "OS," made in 7" to 20" sizes, have longer teeth and less sharply tapered cutters for highest efficiency in softer formations.

Write for Bulletin describing these Bits!

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Directional drilling was pioneered and developed by the Eastman organization; Eastman surveying equipment and tools were developed through practical field experience of our staff; we manufacture all of our products, and guarantee their accuracy and quality.

No matter how remote your wells may be from our service branches, you can obtain all of the benefits of Eastman surveying and directional drilling equipment. Our Export Division includes competent engineers to counsel you, and to supply detailed instructions for the operation of Eastman equipment by your own personnel. Your correspondence will be given immediate attention.

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Manufactured by the Eastman Oil Well Survey Corporation

Produces an accurate, permanent, easily read photographic record of inclination and direction. Made for running inside drill pipe or in open hole. Simple to operate and quickly run, this instrument is employed to carry out survey programs calling for records every 100 feet or less, as well as for the special work of directional drilling.

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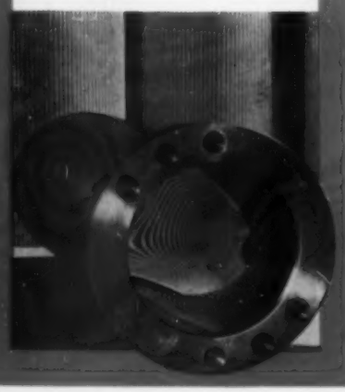

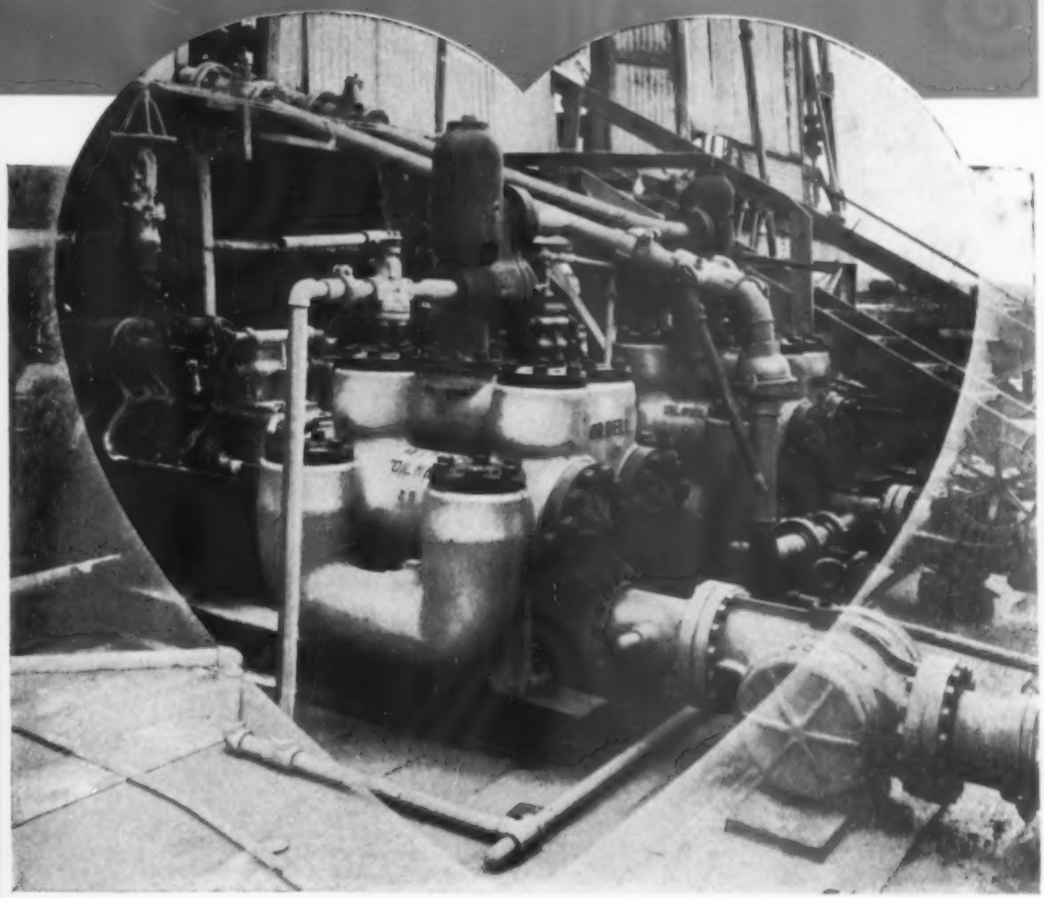

YOUR rig never gets laid up with "heart failure" or "low blood pressure" when there's an "Oilwell" or Wilson-Snyder Slush Pump on the job. These steam and power slush pumps are recognized throughout the oil fields for their smooth operation, dependability, high efficiency. They are the stout hearts of hundreds of drilling rigs.

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THERE IS A PUMP FOR EVERY APPLICATION IN THIS WIDE RANGE OF SIZES

STEAM PUMPS			*POWER PUMPS*	
16¼" x 7¾" x 20"	14" x 7¼" x 18"	7¾" x 20"	7¼" x 14"	6" x 12"
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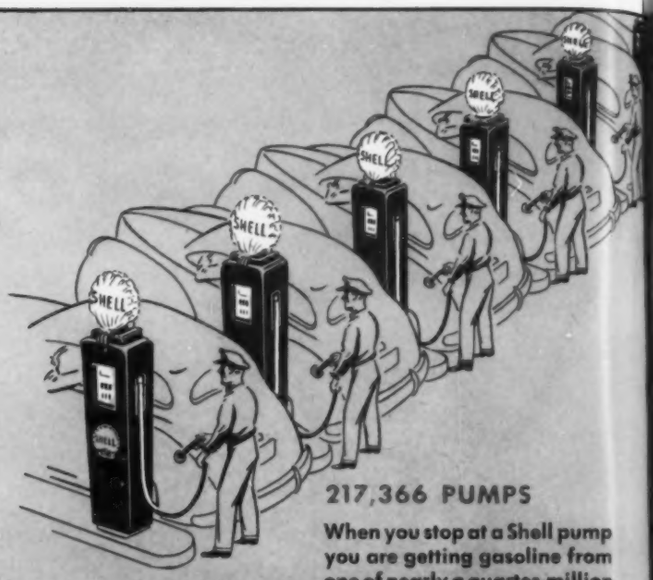
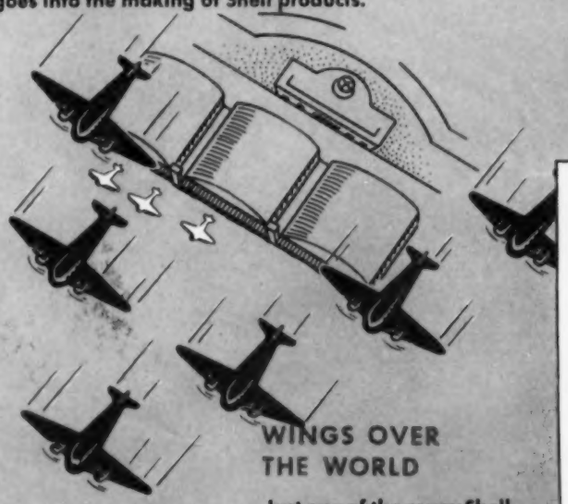
Shell service embraces most of the world. 127 countries provide the varied experience which goes into the making of Shell products.



217,366 PUMPS

When you stop at a Shell pump you are getting gasoline from one of nearly a quarter-million Shell pumps in use throughout the world.



WINGS OVER THE WORLD

Just one of the many Shell Products—Shell Aviation Gasoline is sold at over 2400 airports and airfields throughout the world. Another example of Shell's world-wide experience.

A WORLD OF

ON farms and fruit ranches you will find Shell fertilizers and orchard sprays. In quiet suburban homes Shell Fuel Oil, Shell Household Products, add to the comfort of living. In huge plants of every type Shell Industrial Lubricants are important factors in the constant battle against money-wasting "friction." And

THE ASIATIC PE

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86,000 TONS A DAY

Every day 86,000 tons of crude oil pour out of Shell's oil fields throughout the world. This gives Shell the benefit of many different types of crude oils from which to choose.

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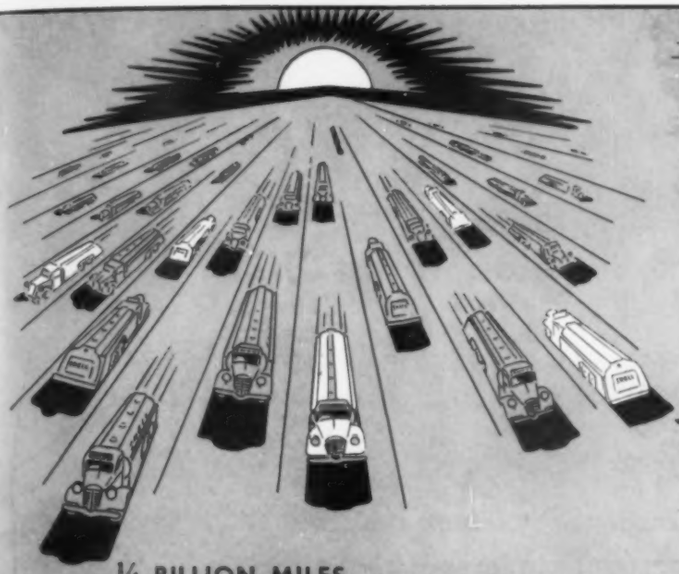
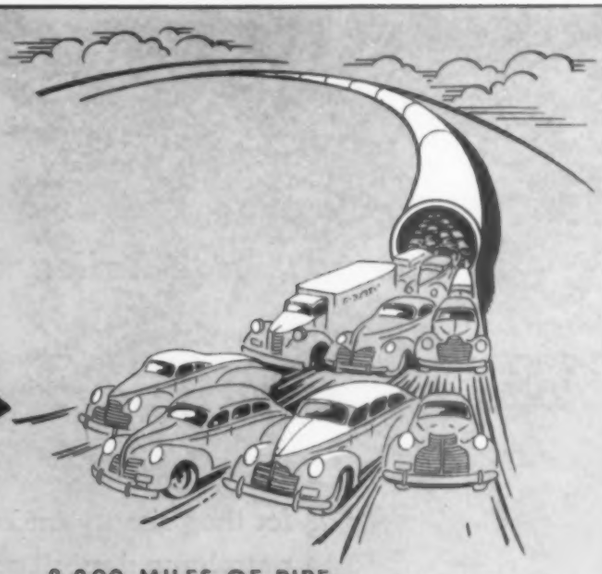


¼ BILLION MILES

In a year, Shell trucks and cars travel over a quarter billion miles delivering Shell products to Shell customers. Every mile they travel adds to Shell's world experience.



8,800 MILES OF PIPE

8,800 miles of Shell pipe line (as well as other means of transportation) are needed to meet the world-wide demand for Shell Products.

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in every form of transportation Shell plays a leading part, too! Behind every Shell Product – whether it be used in the air – on the land – or on the sea – there stands this remarkable record of world experience and service on every continent. And it is available to every Shell customer – everywhere!

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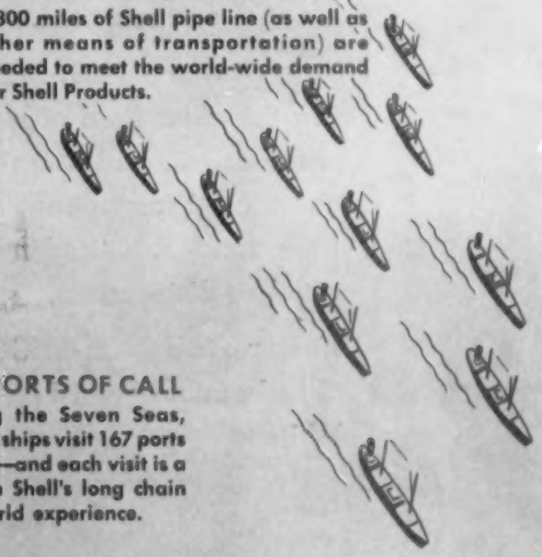
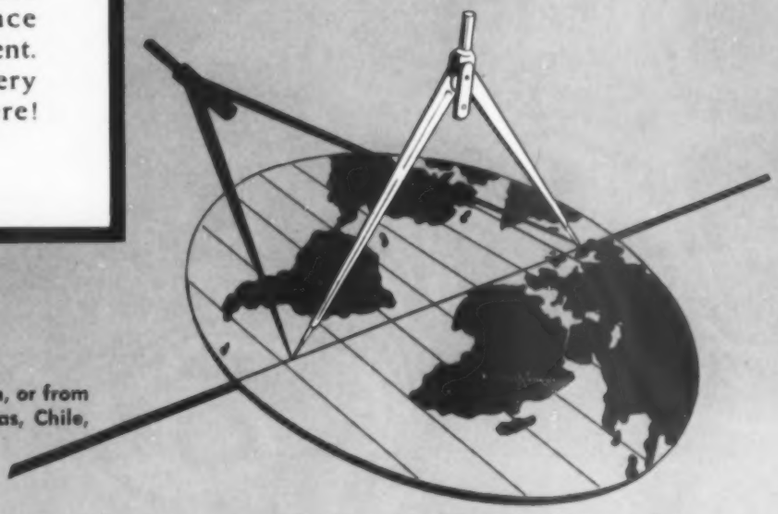


167 PORTS OF CALL

Plying the Seven Seas, Shell's ships visit 167 ports of call—and each visit is a link in Shell's long chain of world experience.



123°

From longitude 70° North to 53° South, or from Hammerfest, Norway, to Punta Arenas, Chile, Shell Products are marketed.

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for the primary and secondary effects which a petroleum deposit produces in its sedimentary environment.

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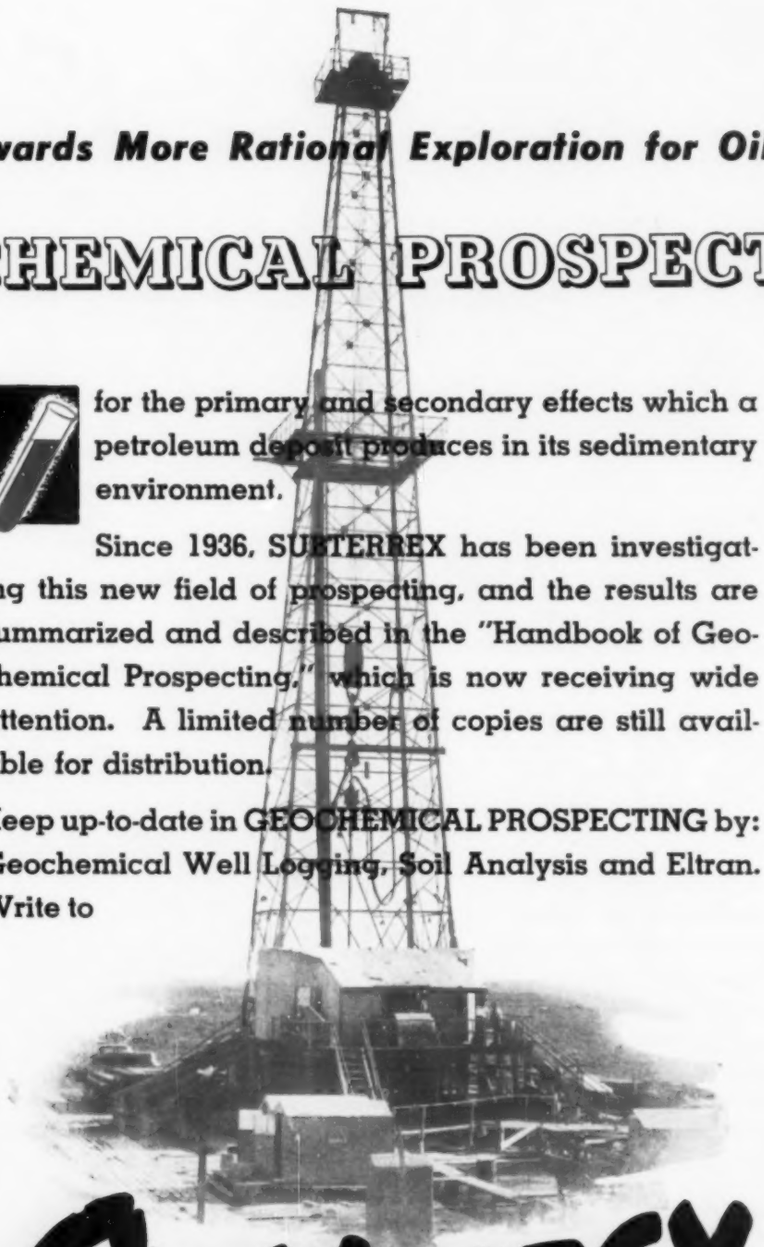

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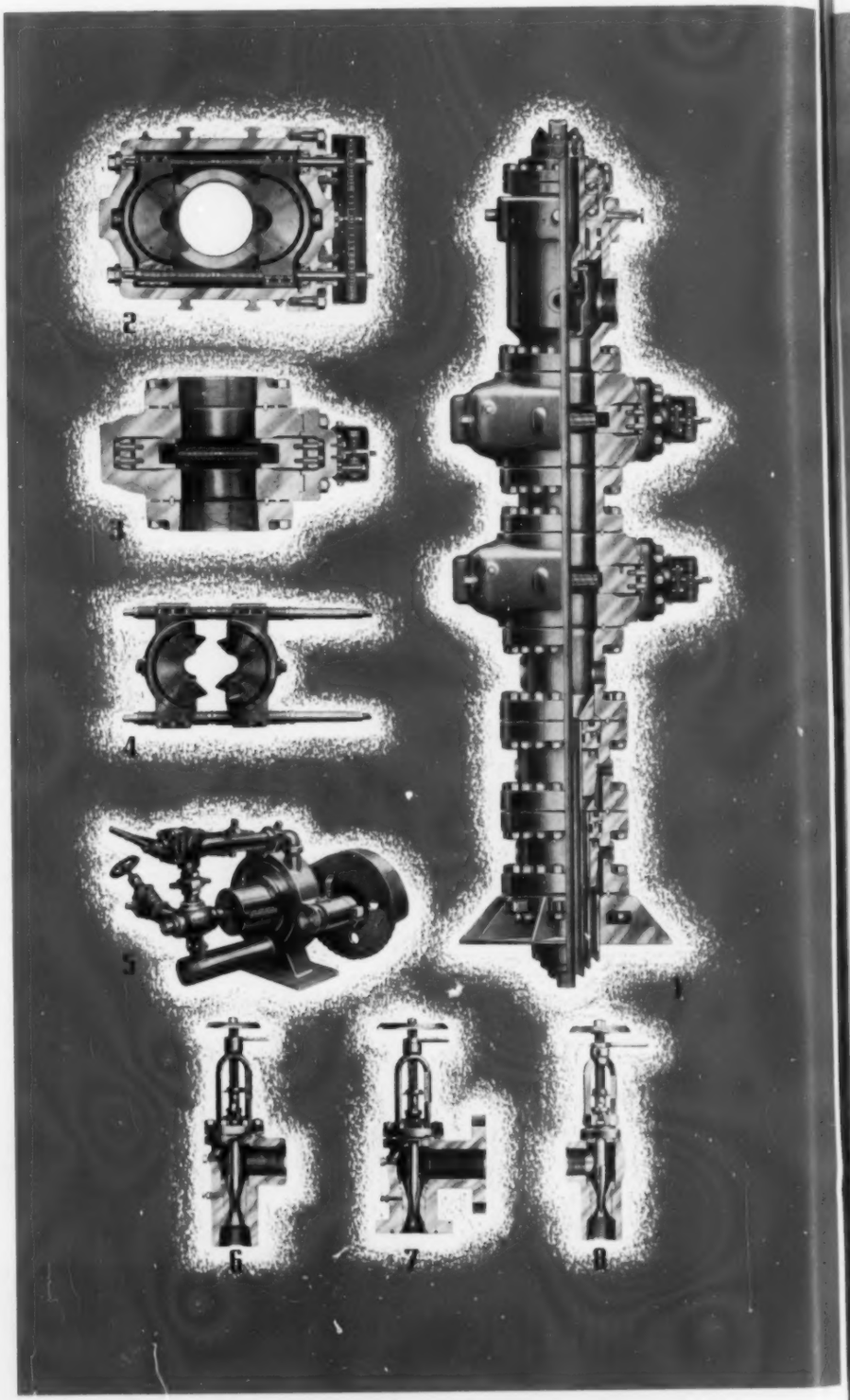
TO VENEZUELA — SHAFFER SENDS

Simplicity of Construction—Ease of Operation —Long Life and Successful Performance—these are the features which have won wide approval for Shaffer High Pressure Drilling Equipment, particularly from operators in remote locations.

After reading the necessarily brief descriptions on these pages, we suggest that you refer to the Shaffer Section of the 1940 Composite Catalog, or send for the separate Shaffer Catalog, where detailed information is given on the complete line of the world's most modern and efficient Pressure Control Equipment.

You are invited to submit your pressure control and pressure drilling problems for recommendations which are based upon longer and more extensive experience than that of any other manufacturer of similar equipment. No expense or obligation is incurred in securing this helpful assistance.



SHAFFER SAFETY HOOK-UPS

Shaffer High Pressure Drilling Equipment is available to meet any drilling condition, and by proper planning it is possible to combine economy, maximum efficiency and complete safety. The modern hook-up (1) shows how a one-size hook-up can be used from start to finish of a well where high pressure is likely to be encountered. A Shaffer Combination Rotating Blow-Out Preventer and Stripper is used above two Shaffer Type 38 Cellar Control Gates, the upper gate being equipped with rams for closing around the drill pipe. The lower gate is equipped with rams for a complete shut-off. This hook-up is ideal for wildcat wells or in remote areas where transportation of equipment is difficult.

With the casing program determined, or the number of strings of casing anticipated, the proper number of Shaffer Full Opening Spool Type Landing Heads are installed, and by merely adding guides of the proper size, when required, the drilling connections never need be changed in size or length.

The modern and efficient design of Shaffer Type 38 Cellar Control Gates is illustrated in views (2) and (3) where the positive method of sealing by the ram rubbers is shown; also the large, strong operating screws which bring the rams smoothly and evenly to the sealing-off position. A new effortless method of closing and opening any Shaffer Control Gate is the Shaffer Gate Closing Engine (5) which operates from the steam line and closes one or more gates with a speed never before possible.

Shaffer Self Centering Rams have been developed to meet the problem of centering small diameter drill pipe so that it is in proper alignment with the rams in larger bore Shaffer Cellar Control Gates. Protruding angular guides (see 4) engage the drill pipe and move it into a centralized position as the rams are closed. The guides telescope into the opposite ram block and permit the abutting faces of the ram blocks to seal perfectly. Self Centering Rams can be furnished

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HIGH PRESSURE DRILLING AND CONTROL EQUIPMENT
FISHING TOOLS THAT EXCEL... Described in the Composite Catalog

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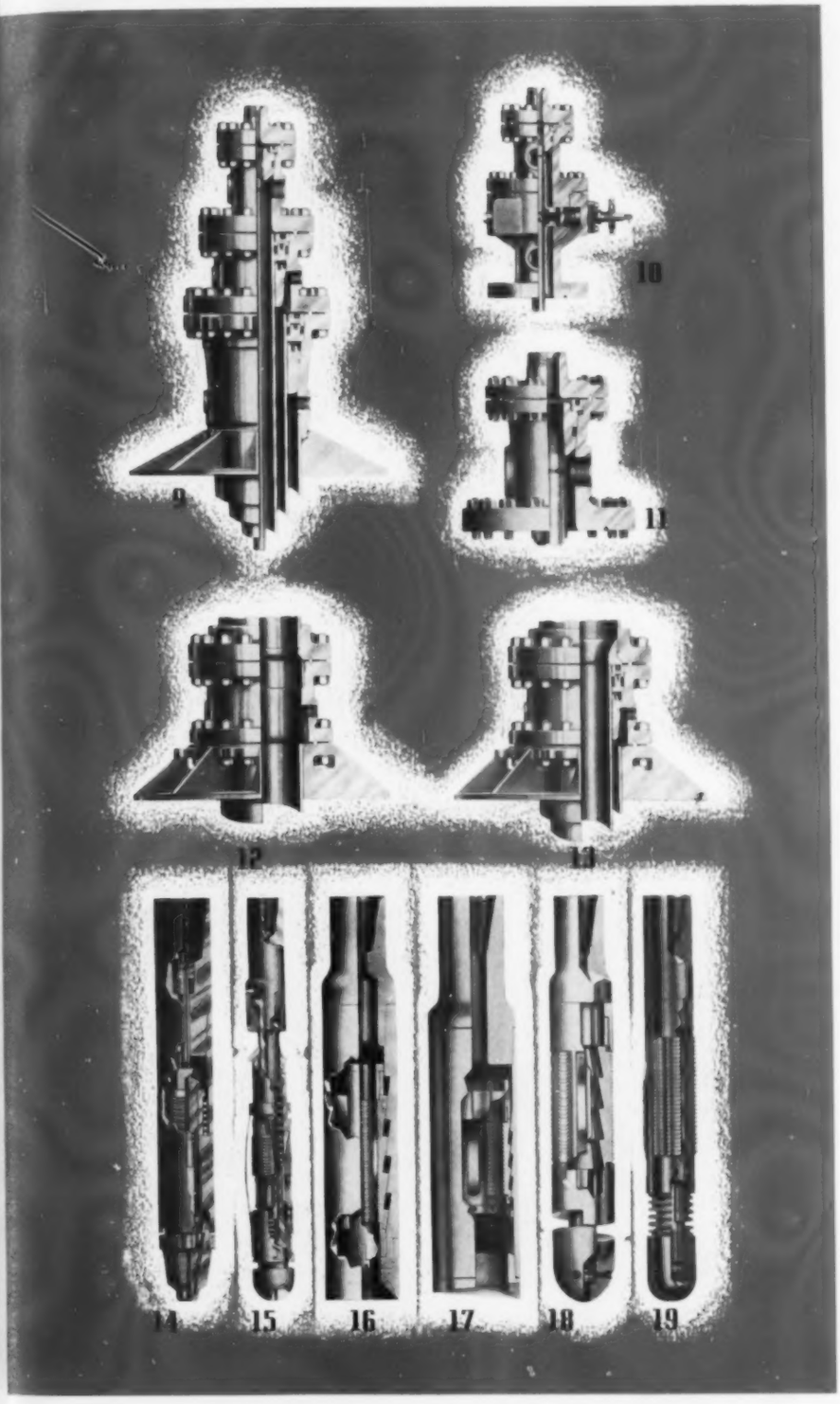
EXPORT SALES OFFICE: Shaffer Tool Works, 30 Rockefeller Plaza, New York, N. Y., U. S. A.

THIS "SAFETY FIRST" MESSAGE



for previous types of Shaffer Cellar Control Gates; details furnished upon application.

CASING EASILY LANDED

The safe landing and packing off of casing is greatly simplified when Shaffer Full Opening Spool Type Landing Heads are used. Three strings of casing are shown landed, individually suspended and packed off by illustration (9); view (12) shows the full, unobstructed opening before the casing is landed, and (13) illustrates the simple, safe method of landing and packing off.

PRODUCTION HOOK-UPS

Shaffer Production Hook-Ups can be supplied to meet any of the varied conditions present in producing oil wells and to meet the preferences of any individual operator. Even under extremely high pressure, tubing can be pulled with ease and safety. The Shaffer Universal Tubing Control Head (10) serves as a blow-out preventer while drilling in and tubing the well. The Shaffer Type 35 Tubing Head (11) shows the tapered bore with the same inside diameter as the casing which permits running tubing catchers, and serves as a spider for the slips when running tubing.

Shaffer Adjustable Flow Beans are universally used for controlling the flow of fluid and regulating the pressure and rate of flow with extreme accuracy. A popular Screw Type is shown in view (6); the same style is made with A.P.I. Ring Joint Flanges (7). Another type which retains all of the flowing qualities of Shaffer High Pressure Flow Beans, but is designed for wells of moderate pressure only (at a correspondingly reduced price) is shown in illustration (8).

SHAFFER FISHING TOOLS

The safe, positive and economical results obtained from Shaffer Fishing Tools are due in large measure to the operation of a rental tool service for many years and to the knowledge thus acquired. Operators in far away locations can depend upon any Shaffer Fishing Tool as being simple in design, sturdy in construction, positive in action, and safe in service.

The ideal tool for left-handing or backing-off the string (when drill pipe is stuck in a tight hole with the tool joint box up) is the Shaffer Expanding Pin Tap (14). It provides a connection as strong as the rest of the fishing string, and has no equal for this service.

For cutting off casing, tubing or liners, the Shaffer Inside Casing Cutter (15) can be run on either drill pipe or tubing. Cuts smoothly without chattering, and is easily released and moved up or down the hole for repeated cuts.

Shaffer-Hamon Rotary Releasing Sockets are ideal for recovering drill pipe, casing, tubing or liners. This type (16) is recommended for use with right-hand tools.

Shaffer Sockets are used for recovering either loose fish or stuck fish. The Shaffer T. & T. Rotary Releasing Socket (17) is preferred with left-hand tools.

The Shaffer-Hamon Rotary Releasing Spear (18) is preferable when right-hand tools are used for removing casing or pipe; for setting liners; for holding or jarring jobs.

Shaffer Spears are the most readily releasing spears in use today. The Shaffer T. & T. Rotary Releasing Spear (19) is preferable for use with left-hand tools.

LOOK for the SHAFFER SECTION

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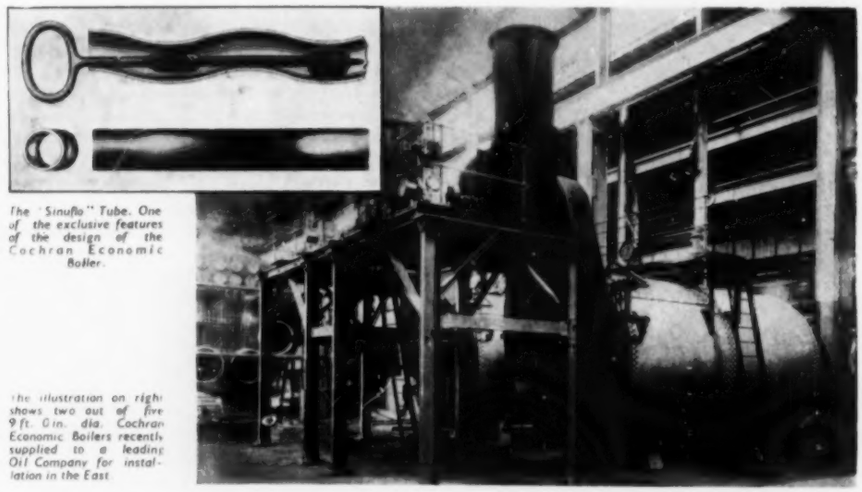

The "Sinuflo" Tube. One of the exclusive features of the design of the Cochran Economic Boiler.

The illustration on right shows two out of five 9 ft. 0 in. dia. Cochran Economic Boilers recently supplied to a leading Oil Company for installation in the East.

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Royal Dutch Shell
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COCHRAN

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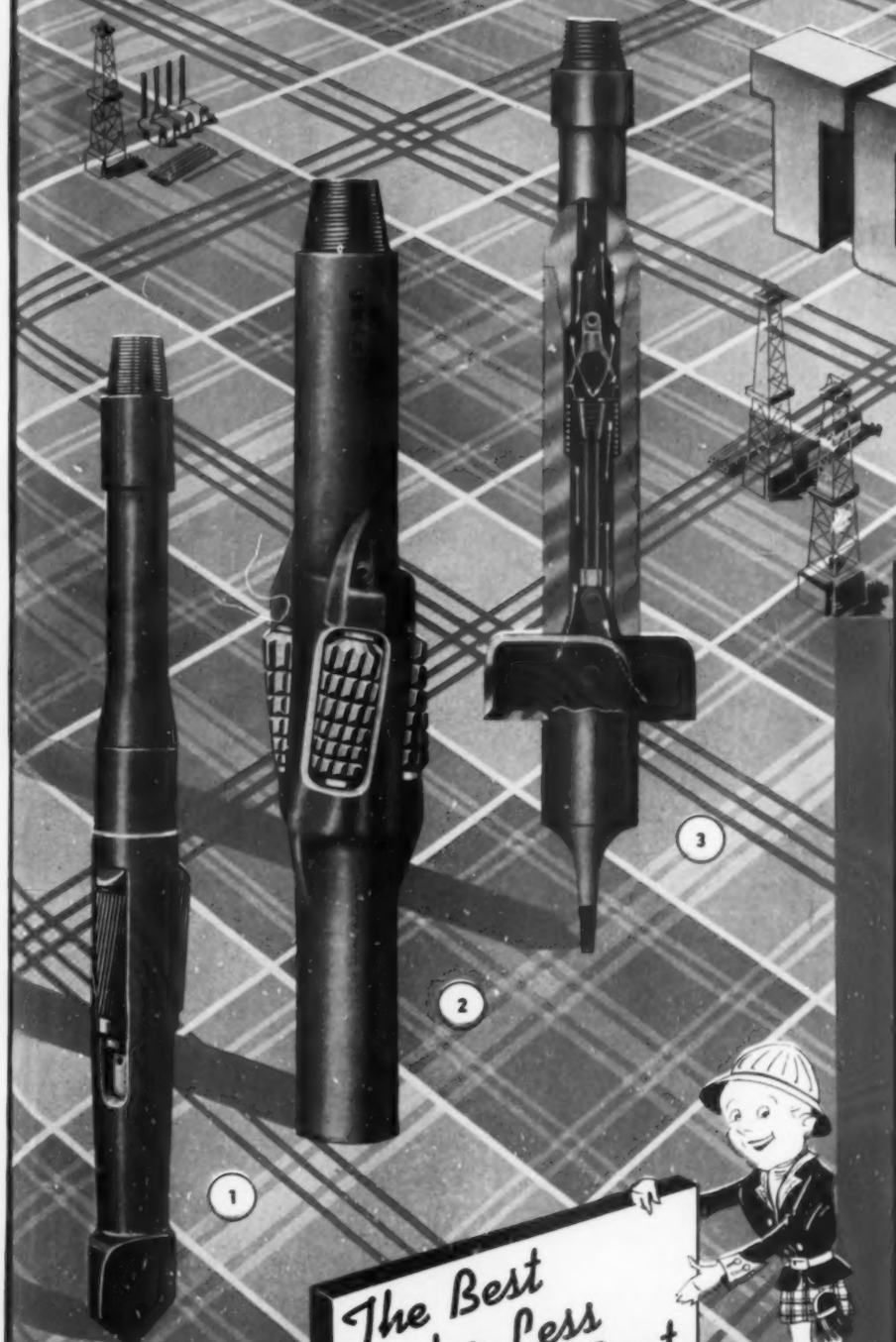
TAS/Ch 129

USED WHERE *Performance* COUNTS

GRANT TOOLS



Grant Tools Are *Safer* Tools

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Your Money Buys *More* When You Specify GRANT

1 GRANT UNDERREAMER AND ROTARY HOLE ENLARGER: Combines both hydraulic and spring expanding action; either may be used separately if desired. Thus **full gauge hole all the way** is assured. Positive expansion plus inherent strength and solidity make this **one of the safest tools to use in the hole.** The Grant Underreamer can be run in and out of the shoe as often as desired **without need for round trips** as no setting or tripping is required.

2 GRANT ROLLER-BEARING CUTTER REAMER: Combines shearing and cutting action . . . no part rotates uselessly . . . working load is evenly distributed over entire cutter . . . makes "flats" a rarity. Examine the "angle" of cutter and its tapered construction.

3 GRANT HYDRAULIC EXPANSION WALL SCRAPER: The logical tool for removing incrusted rotary mud and other irregularities in the hole. A vital necessity when preparing wells for production, gravel packing or cementing, etc. Patented Circulation Control Head protects vital parts from wear. Expansion range from 4" to 40", using 8 bodies.

All these tools (and more) are pictured and described in detail in our catalog C-39. Send for copy.

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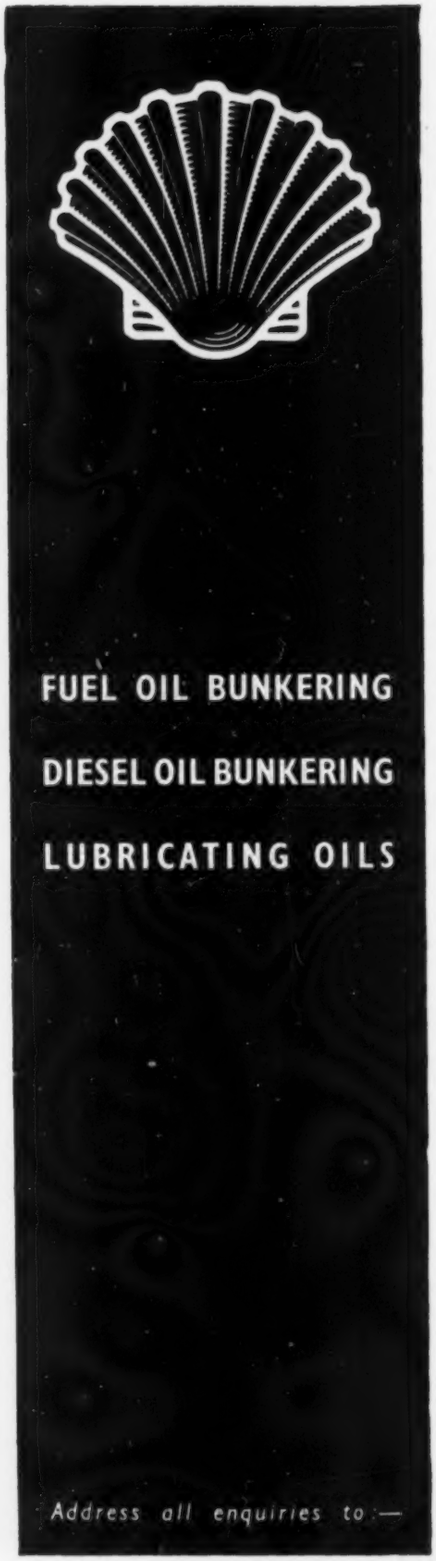

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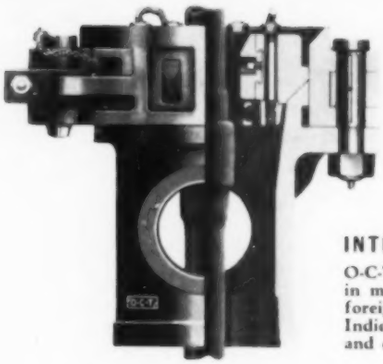
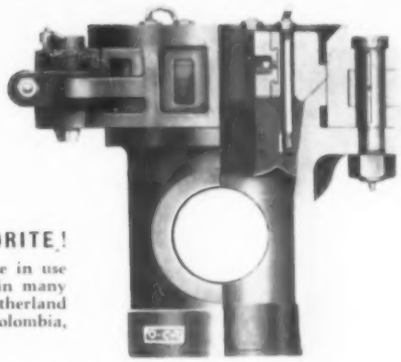
SAFETY-CONSCIOUS OPERATORS THE WORLD OVER—

Just to be DOUBLY *sure*



INTERNATIONAL FAVORITE!

O-C-T Blowout Preventers are in use in most domestic fields and in many foreign oil countries — Netherland Indies, Portugal, Venezuela, Colombia, and others.



O-C-T TYPE "D" PREVENTER WITH STRIPPER RUBBER

The O-C-T Stripper Rubber Type Blowout Preventer illustrated above provides the safest and quickest means of running drill pipe, casing, or tubing under pressure. The scientifically designed stripper type pack-off, which readily interchanges with the regular type pack-off in all types of O-C-T Preventers, passes pipe collars yet effectively seals in well pressures. The unusual performance and dependability of O-C-T Stripper Type Preventers has been definitely proven under the most adverse conditions. A number of operators have tubed as many as six, 7500' wells with a single stripper rubber without signs of leakage or failure. Full particulars on the complete line of O-C-T Blowout Preventers will be sent on request.

O-C-T TYPE "D" PREVENTER WITH REGULAR PACK-OFF

The O-C-T Type "D" Preventer with regular pack-off has long been a favorite with safety-conscious operators who rely upon its sound design to provide an all-important secondary seal above a ram type preventer. With the pack-off in the locked position, drill pipe may be rotated constantly as long as desired, or raised and lowered between tool joints to prevent sticking while circulating heavy mud to subdue kicking well pressures. Thus, the comparatively inexpensive O-C-T pack-off, which may be quickly and easily replaced, relieves the packers in the ram type preventer of all wear that would ordinarily be imposed upon them. Further, by alternately opening and closing the ram type preventer and the O-C-T Preventer, the drill pipe may be pulled or run into the hole under pressure.

O-C-T Blowout Preventers are available threaded and with outlets as shown, or flanged and less outlets as desired. Write for the complete O-C-T Catalog.

O-C-T MANUFACTURES A COMPLETE LINE OF CONTROL EQUIPMENT FOR DRILLING AND PRODUCING WELLS

Export Representative: Vail K. Wilson, Jr.
30 Rockefeller Plaza, New York, N. Y.

OIL CENTER TOOL CO.
QUALITY O-C-T PRODUCTS
HOUSTON, TEXAS, U·S·A

Selling Through Leading Supply Stores

SOUTH AMERICA AND BAKER OIL TOOLS . . .

An ancient axiom states that "Before one can really know his neighbor he must know his neighbor's problems, he must *see* those problems through his neighbor's eyes; *hear* them through his neighbor's ears, and *visualize* them through his neighbor's mind. Only then can he understand those problems, help in their solution and thus become a friend in action as well as in thought."

It is on this premise that Baker Oil Tools has approached its neighbors in South America. To better understand their every-day oil well drilling and production problems, Baker has sent many representatives to this area to make extensive studies, right on the ground, of the problems encountered in connection with the landing and cementing of casing, well repair and well completion work.

This information, in turn, has been relayed to Baker engineers in the United States where it has been subjected to further analysis and study to determine how Baker equipment can assist in the solution of those problems, and thus become "a friend in action as well as in thought."

The various devices making up the Baker Line of "Practical and Dependable" Oil Tools, as experienced operators will testify, have proved their adaptability in every oil field throughout South America (as well as in other parts of the world)—their safety, efficiency and performance being a matter of field record. Baker suggests that among its tools and devices you may find the solution to some of your immediate or anticipated cementing, well completion or well repair problems.

FOR COMPLETE INFORMATION ON BAKER "PRACTICAL AND DEPENDABLE" OIL TOOLS REFER TO OR SEND FOR THE FOLLOWING:

★ Baker Section of the 1939 Composite Catalog, containing 56 pages of informative text matter and illustrations covering the entire Baker Line of Equipment.

★ Individual 1939 Baker Catalog (a reprint of the Baker Section in the Composite Catalog).

★ Baker Sections in the 1939-1940 Drilling Equipment Directory.

★ Baker Broadcast No. 17-A, a comprehensive 40-page treatise describing and illustrating the many important field applications for the Baker Model "K" Cement Retainer.

★ Baker Cement Retainer News Service . . . a Monthly Bulletin Service of successful operating ideas involving the Baker Cement Retainer and its latest applications. This service has only recently been inaugurated and if you have not received it and would like to be placed on the mailing list, send your request to Baker Oil Tools, Inc., P. O. Box 71, Huntington Park, Calif., U. S. A.

★ Baker Broadcast No. 19, giving complete information covering the many practical applications for the Baker Wall Scraper and Baker Wall Sampler. It contains 40 pages of detailed information and illustrations and should be in your reference file.

R. C. Baker

President

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